# Service Manual

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Sec. 2 | Service Information

Sec. 3 Disassembly Procedures

Sec. 4 Mechanism

Sec. 5 Electrical Adjustments

Sec. 6 Block Diagrams

Sec. 7 Schematic Diagrams

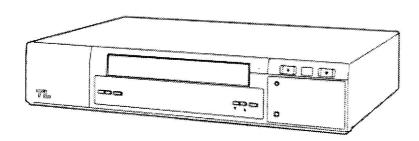
Sec. 8 Exploded Views & Replacement Parts List

VHS

Time Lapse Recorder

AG-TL350E/B

**Z-MECHANISM** 



Please refer to the information of Z-Mechanism (Order No. VSD9706M201, VRD9802005C2) and the Circit Board Diagrams and Electrical Part Lists are described in CD-ROM Service Manual (Order No. BSD01021K0X).

## **Panasonic**

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#### **△ WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicans. Any attempt to service or repair the product or products deal with in this service manual by anyone else could result in serious injury or death.

## **Specifications**

Power Source:

220 - 240 V AC, 50 - 60 Hz

**Power Consumption:** 

20 W

General

Operating

Temperature: 5

5°C to 40°C

Operating

Humidity:

35% to 80%

Dimensions:

430 (W) × 88 (H) × 293.5 (D) mm

Weight:

Approx. 3.7 kg

Video Recording/

Playback

System:

4 rotary heads, Azimuth recording

system, VHS format

Tape Speed:

23.39 mm/s (3H mode)

Tape Format:

VHS tape

Recording Time:

3 hours (with 180-minute tape/3H

mode)

FF/REW Time:

Less than 2 min. (with 180-minute

tape)

Video

Television

System:

CCIR Standard (625 lines, 50 fields)

PAL colour signal

Modulation

System:

Luminance; Frequency modulation

recording

Colour signal; Converted subcarrier

phase shift recording

**Video Input** 

(BNC):

1.0 Vp-p, 75 ohms

**Video Output** 

(BNC): S/N: 1.0 Vp-p, 75 ohms, unbalanced

B/W mode; 45 dB (3H mode, Detail

OFF)

Colour mode; 45 dB (3H mode,

Detail OFF)

**Audio** 

Line Input

(Phono): -10 dBV, 47 kohms Mic Input (3 mm): -60 dBV, 600 ohms

Line Output

(Phono): -8 dBV, 1 kohm Track: 1 track (normal)

Recording/

Playback

mode: 3H/6H/12H/24H mode

Connectors

Alarm Input/

REC IN: Short circuit

**Alarm Reset** 

Input: +4 V - +14 V

Standard accessory

**Power Cord:** 

× 1

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

## Caution for AC Mains Lead

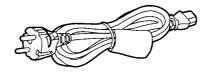
#### FOR YOUR SAFETY PLEASE READ THE FOLLOWING TEXT CAREFULLY.

This product is equipped with 2 types of AC mains cable. One is for continental Europe, etc. and the other one is only for U.K.

Appropriate mains cable must be used in each local area, since the other type of mains cable is not suitable.

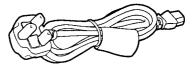
#### FOR CONTINENTAL EUROPE, ETC.

Not to be used in the U.K.



#### FOR U.K. ONLY

If the plug supplied is not suitable for your socket outlet, it should be cut off and appropriate one fitted.



#### FOR U.K. ONLY

This appliance is supplied with a moulded three pin mains plug for your safety and convenience.

A 13 amp fuse is fitted in this plug.

Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 13 amps and that it is approved by ASTA or BSI to BS1362.

Check for the ASTA mark or the BSI mark on the body of the fuse.

If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.

If you lose the fuse cover the plug must not be used until a replacement cover is obtained.

A replacement fuse cover can be purchased from your local Panasonic Dealer.

IF THE FITTED MOULDED PLUG IS UNSUITABLE FOR THE SOCKET OUTLET IN YOUR HOME THEN THE FUSE SHOULD BE REMOVED AND THE PLUG CUT OFF AND DISPOSED OF SAFELY. THERE IS A DANGER OF SEVERE ELECTRICAL SHOCK IF THE CUT OFF PLUG IS INSERTED INTO ANY 13 AMP SOCKET.

If a new plug is to be fitted please observe the wiring code as shown below.

If in any doubt please consult a qualified electrician. **WARNING:** THIS APPLIANCE MUST BE EARTHED.

**IMPORTANT:** The wires in this mains lead are coloured in accordance with the following code:

Green-and-Yellow: Earth

Blue:

Neutral

Brown:

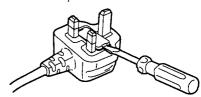
Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

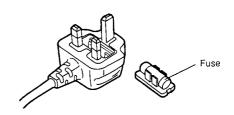
- The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the Earth symbol  $\frac{1}{2}$  or coloured GREEN or GREEN-AND-YELLOW.
- The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.
- The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

#### How to replace the fuse

1. Open the fuse compartment with a screwdriver.



2. Replace the fuse.



## **SAFETY PRECAUTIONS**

#### **GENERAL GUIDELINES**

- 1. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
- After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
- After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

#### LEAKAGE CURRENT COLD CHECK

- Unplug the AC cord and connect a jumper between the two prongs on the plug.
- 2. Measure the resistance value, with an ohm meter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. The resistance value must be more than  $5M\Omega$ .

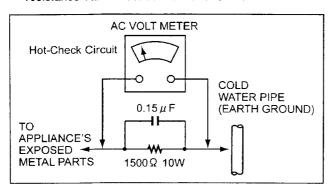


Figure1

#### **LEAKAGE CURRENT HOT CHECK (See Figure 1)**

- Plug the AC cord directly into the AC outlet.
   Do not use an isolation transformer for this check.
- 2. Connect a  $1.5k\Omega$ , 10W resistor, in parallel with a  $0.15\mu$  F capacitor, between each exposed metallic part on the set an a good earth ground such as a water pipe, as shown in Figure 1.
- 3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
- 4. Check each exposed metallic part, and measure the voltage at each point.
- Reverses the AC plug in the AC outlet repeat each of the above measurements.
- 6. The potential at any point should not exceed 0.15 volts RMS. A leakage current tester (Simpson Model 229 equivalent) may be used to make the hot checks, leakage current must not exceed 0.1 milliamp. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

#### **ELECTROSTATICALLY SENSITIVE (ES) DEVICES**

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically sensitive (ED) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

- Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground.
  - Alternatively, obtain and wear a commercially available discharging wrist trap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
- After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
- 3. Use only a grounded tip soldering iron to solder or unsolder ES devices.
- Use only an anti-static solder removal device classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
- Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
- Do not remove a replacement ES device from its protective package until immediately before you are ready to install it.
  - (most replacement ES devices are package with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
- 7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
  - CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
- 8. Minimize bodily motions when handling unpacked replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

#### X-RADIATION

#### WARNING

- 1. The potential source of X-radiation in EVF sets is the High Voltage section and the picture tube.
- When using a picture tube test jig for service, ensure that jig is capable of handling 10kV without causing xradiation.

**Note:** It is important to use an accurate periodically calibrated high voltage meter.

3. Measure the High Voltage. The meter (electric type) reading should indicate 2.5kV, ± 0.15kV. If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure. To prevent an x-radiation possibility, it is essential to use the specified picture tube.

## SECTION 1

## **OPERATING INSTRUCTIONS**

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### **Features**

#### Recording and playback up to 24-hour time modes

In addition to the 3-hour/6-hour time modes, recording and playback can be performed in the time lapse modes (12-hour, 24-hour modes).

#### Full line-up of recording functions

Included in the wide range of recording functions are restoration-of-power-after-failure recording, recording every day and by the days of the week using the internal timer, external timer recording, alarm recording, emergency recording and repeat recording.

#### Playback functions

Among the convenient playback functions are the recording review function for immediate viewing of recorded material, the handy search function for locating images promptly, and the forward/reverse field advance and still-picture functions for careful viewing of particular scenes.

#### Auto tracking function

The tracking can be automatically adjusted by pressing the "-" and "+" tracking buttons together.

#### Built-in time/date generator

This unit comes with a built-in microprocessor with a calendar function for displaying the time on the display or TV monitor and for controlling the time of the internal timer.

#### Recording lock function

A double recording mode lock function is provided for safeguarding against operational errors during recording.

#### Connection to frame switcher

Easy connection to a frame switcher is possible once the unit has been connected to the video input and camera SW connectors.

 Do not supply signals from colour cameras and blackand-white cameras simultaneously to the camera input conectors since this may disturb the synchronization on the monitor screen or generate noise.

#### Hour meter

The unit contains an hour meter which provides useful information for maintenance and inspections.

#### Remote control

The unit can be operated from a distance of about 5 meters if the AG-A11 remote controller, available as an optional accessory, is connected.

#### **IMPORTANT**

"Unauthorized recording of copyrighted television programmes, films, video tapes and other materials may infringe the right of copyright owners and be contrary to copyright laws."

## **Regular Maintenance Service Recommendation**

Although this unit is designed to withstand long-term use, the items listed below should be inspected regularly so that the unit is kept in perfect working order. Use the hour meter to know when to conduct the inspections. The VTR is a piece of precision-made equipment and, as such, it is recommended that the user enter into a maintenance and inspection agreement to keep the unit operating free of trouble or failures. For further details, please consult with your dealer.

Cumulative operation time (hours)	500	1000	1500	2000	2500	3000	3500	4000	8000	12000
Transport system cleaning	•	•	•	•	•	•	•	•	•	•
Audio heads	•	•	•	•	•	•	•	•	•	0
Video heads	•	•	•	•	•	•	•	0	0	0
Cylinder unit	•	•	•	•	•	•	•	•	•	0

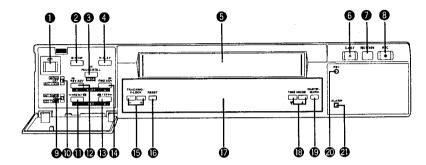
O Service life inspection

Cleaning

(12-/24-hour mode use)

The above table merely serves to lay down general guidelines for the inspection of typical parts involved in regular inspections. The timing of the inspections needs to be adjusted according to the VTR's operating environment.

### **Parts And Their Functions**



#### 1 (b/) (STANDBY/ON) switch

The unit is turned on when this switch is pressed. When the switch is pressed again, the unit is in standby mode.

#### 2 STOP button

When this is pressed, the tape stops travelling.

#### PAUSE/STILL (PAGE) button

When this is pressed during recording, the tape temporarily stops travelling.

When pressed during playback, the tape temporarily stops travelling, and a still picture appears on the TV monitor. When pressed again, the tape travel resumes. The pages on the menu screen are advanced when the button is pressed while a menu screen is displayed.

#### PLAY button

Playback starts when this button is pressed.

#### Cassette holder

This is the loading slot for the video cassette.

#### 6 EJECT button

This is used to eject the video cassette.

#### REC REVIEW button

When the button is pressed during recording, the tape runs temporarily in the reverse direction, and after the recorded section has been played back, the unit is returned to the recording mode.

#### REC button

Recording starts when this button is pressed.

#### TIMER MODE switch

This is the operation switch for internal timer recording or external timer recording. The displays shown below light on the display panel.

INT TIMER: At the times set by the internal timer, the power is automatically turned on

or off and recording starts or stops.

**OFF:** When timer recording is not performed.

**EXT TIMER:** When the external power is turned on, recording starts automatically.

#### MENU/REC LOCK switch

When this switch is set to REC LOCK, the time mode and operation buttons as well as the power switch cannot be operated while recording is in progress.

When it is set to MENU, the menu screen appears.

#### REW (SET --) button

When this button is pressed, the tape is rewound. When it is kept depressed during playback, the review mode is established.

When it is pressed once during playback in the alarm search mode, the unit is placed in the review mode.

When a menu screen is displayed, it is used to change an item (decrement a value).

#### P Field REV ADV (SHIFT ▼) button

When this is kept depressed during still-picture playback, the picture is advanced field by field in the reverse direction. When it is released, the still picture reappears.

When it is pressed while a menu screen is displayed, the setting items move downward.

#### (B) FF (SET +) button

When this is pressed, the tape is fast forwarded. When it is kept depressed during playback, the unit is placed in the cue mode.

When it is pressed once during playback in the alarm search mode, the unit is placed in the cue mode. When a menu screen is displayed, it is used to chance an item (increment a value).

#### M Field FWD ADV (SHIFT ►) button

When this is kept depressed during still-picture playback, the picture is advanced field by field in the forward direction. When it is released, the still picture reappears. When it is pressed while a menu screen is displayed, the setting items move toward the right.

#### Tracking (-, +) buttons/V-LOCK buttons

These buttons are used to adjust the tracking or to compensate the vertical dancing during still picture. If noise appears on the playback picture, press the buttons to adjust the tracking is such a way that the picture is made as clear as possible. When both buttons are pressed together during 3- or 6-hour mode playback, the tracking is adjusted automatically.

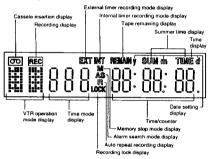
If the image shakes slightly in the vertical direction during still picture, press the V-LOCK buttons to reduce the dancing.

Further, the time/date display position can be adjusted during STOP and EJECT (see page 13).

#### ® RESET button

When this button is pressed, the counter display is reset to 0:00:00.

#### Display panel



#### · Operation mode displays

Operation mode	Display
Playback	□ or ▷
Recording	Rec lamp lights.
Still picture	00
Recording pause	Rec lamp lights.
Recording check	Rec lamp lights.
Fast forwarding	DD
Rewinding	44
Cue	DD
Review	44
Forward field advance	or 🖟 (Flashing)
Reverse field advance	[] or <[] (Flashing)

#### Error messages

An error code appears when trouble has occurred during operation.

E-2: Trouble in video cassette insertion area

E-3: Trouble in video cassette tape loading area

E-4: Trouble in cylinder area

E-5: Trouble in tape transport area

d: Formation of condensation (dew)

#### TIME MODE (▼, ▲) buttons

These buttons are used to select the recording and playback time mode. Each time this is pressed, the time mode changes in the following sequence:

#### COUNTER/SEARCH selector button

When this button is pressed, the display on the display panel changes to time, counter, counter memory, alarm search and number of repeat recording times. The M mark appears on the display panel in the counter memory mode. When the tape is fast forwarded or rewound in this mode, the counter will automatically stop when 0:00:00 is approached. The AS mark appears on the display panel in the alarm search mode. When the tape is fast forwarded or rewound in this mode, the unit is automatically set to still-picture playback at the alarm recording section. If the FF button or REW button is pressed during playback with alarm search, the search will lock, (If this button is pressed while the tape is being fast forwarded or rewound, counter memory and alarm search will not function )

"\*\* PAS" is displayed during repeat recording.

"\_\_PAS" appears at all other times.

(where "\*\*" denotes the number of repeat times)

#### REC display lamp

This lamp lights while recording is in progress. It goes off when recording has finished.

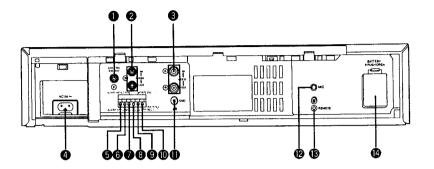
#### ALARM display lamp

This remains lighted while alarm recording is in progress. It flashes when alarm recording ends.

#### For Swedish and Danish Customers

- Aven om denna omkopplare är i "ტ"-läge, gar fortfarande en del av apparaten nätspänning.
- Selv om denne omskifter er i "d" stilling, tiløres en del af apparatet stadig strøm.

### **Parts And Their Functions**



#### Camera switching output connector

Camera switching output connector; connect it to the frame switcher.

#### 2 Audio input/output connectors

Audio input/output connectors (phono jacks)

#### Video input/output connectors

Video input/output connectors (BNC); connect the input connector to the video camera, etc. and the output connector to the TV monitor, etc.

#### AC IN connector

Connect the supplied power cord to an AC outlet.

#### 6 Alarm input connector

Alarm recording input connector; connect it to the external sensor.

#### 6 COMMON terminal

#### Alarm reset input connector

Input connector for releasing alarm recording; a +4 to +14 V DC voltage is required.

#### REC IN connector

Input connector for recording

#### Tape end output connector

When the cassette tape comes to its end during recording, the alarm device installed externally is activated.

#### MARNING/REC output connector

When trouble has occurred in the unit, the alarm device installed externally is activated. Error warning or recording low signal selected on the menu screen 3 is output.

### GND Terminal

This terminal is connected to the signal ground terminal of the connected unit in order to reduce noise. It is not connected to ground for safety purposes.

#### MIC input jack

Input jack (3 mm) for an external microphone. This jack has precedence when signals are supplied simultaneously to this jack and the audio input connectors.

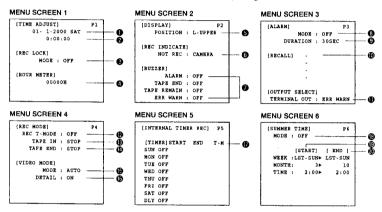
#### (B) REMOTE control connector

For connecting the AG-A11 remote controller which is available as an optional accessory.

#### Battery installation area

Install the battery in this area. See "Lithium Battery" on page 3.

- · When a menu screen has appeared, the items are set using the page, shift and set buttons.
- Advance through the pages (page up) of the menu screen using the page button.
- Move the items (downward or toward the right) using the shift button.
- Change the items (increment or decrement the values) using the set button.



#### **MENU SCREEN 1**

In addition to the date and time display and the recording mode lock setting which appear on the TV monitor, the hour meter is displayed on Menu Screen 1.

- Date setting (see page 12)
- 2 Time setting (see page 12)

Recording mode lock

ON: LOCK on the front display tube flashes, and all operations except for REC REVIEW are prohibited while recording is in progress.

A Hour meter

This indicates the unit's total operation time (the cumulative total for the cylinder rotation time).

### Menu Screens

#### **MENU SCREEN 2**

The time/date display position, monitor screen blue display and buzzer settings are performed on Menu Screen 2.

6 Display position selection

This selects the position where the date and time are to be displayed on the TV monitor. (L-UPPER ↔ R-UPPER ↔ L-BOTTOM ↔ R-BOTTOM ↔ CENTRE ↔ OFF ↔ L-UPPER...)

Blue display

This sets a blue display on the monitor screen at all times except while recording or playback is in progress. BLUE: The display on the monitor screen is blue at all times except while recording or playback is in progress.

CAMERA: The pictures from the video input connector are shown on the monitor screen at all times except while playback is in progress.

Setting of the buzzer sound

ALARM: The buzzer sounds once alarm recording is performed.

TAPE END: When the tape end is reached in the recording mode, the buzzer sounds while the tape is at the end.

TAPE REMAIN: The buzzer sounds when there is only about 3% (with an NV-E180 tape) of the tape remaining before the end is reached in the recording

ERR WARN: The buzzer sounds when the unit is set to the warning status.

To release the buzzer:

ALARM: Release alarm recording.

TAPE END: Transfer the mode from the tape end or press the STOP button

TAPE REMAIN: Transfer the mode (but not to PAUSE or REC REVIEW) from the recording mode or press the REC button.

ERR WARN: Release the warning status.

- · When TAPE END or TAPE REMAIN has been set to OFF, the buzzer will not sound: however, the REMAIN display will remain lit or flashing.
- When TAPE END or TAPE REMAIN has been set to ON. REMAIN lights or flashes on the display tube at the same time as the buzzer sounds. They cease flashing when the buzzer is released.

The remaining tape is displayed only with NV-E120 and NV-E180 tapes. It is not displayed when any other tapes are used.

#### MENU SCREEN 3

The alarm recording mode and terminal output are set on Menu Screen 3.

8 Setting of alarm recording and recording time mode during alarm recording (see page 19)

When there is an alarm input during recording in the time lapse mode, the recording time mode is switched to the designated mode (3H/6H), and the details of the alarm status are faithfully recorded.

Alarm recording duration setting

This sets the time allowed to elapse from the start of alarm recording until its end. This time can be set individually from 30 sec. to 10 min.

 $(30 \text{ SEC} \rightarrow 1 \text{ MIN} \rightarrow 2 \text{ MIN} \rightarrow 3 \text{ MIN} \rightarrow 5 \text{ MIN} \rightarrow$ 10 MIN → CONTINUE → MANUAL)

CONTINUE: Alarm recording continues until the

MANUAL: Alarm recording is performed while the alarm input continues.

( Alarm recall (see page 20)

This checks the time when an alarm signal was input (up to 4 times).

1 Terminal connector output signal setting

ERR WARN: When trouble has occurred in the unit (AUTO OFF), the LOW signal is output. REC: The LOW signal is output during recording.

OPE-3

#### **MENU SCREEN 4**

Recording mode and video output are selected on Menu Screen 4.

Recording time mode selection

When recording starts, the set time mode is always established.

OFF: The time mode can be set as desired using the time mode button on the VTR's sub panel. The mode can be changed even during recording.

3H: 3-hour mode (compatible with the standard mode of ordinary VTR's).

6H: 6-hour mode (compatible with the standard mode of ordinary VTR's).

12H: 12-hour mode (linear slow recording) 24H: 24-hour mode (linear slow recording)

B Selection of VTR operation when cassette is inserted

STOP: Stop mode

REC: Simply by inserting the cassette tane. recording is started automatically.

**REW** ▶ **REC**: When the cassette is inserted, it is first rewound to the start of the tape and then recording is started automatically.

(A) Selection of operation when tape end is detected during recording (see page 18) STOP: Stop mode

REW: The tape is automatically rewound to the start where it stops.

REPEAT: The tape is automatically rewound to the start, and recording is repeated.

EJECT: The tape is ejected.

(B) Video signal mode

This selects the operation of the colour/black-andwhite automatic selector circuit.

AUTO: The circuit automatically identifies the type of video input or playback signals, and selects the colour or black-and-white mode accordingly.

COLOUR: The colour mode is forcibly established. B W: The black-and-white mode is forcibly established.

Playback picture detail selection

date and time have not been set.

summer time mode is to end.

and one of SUN through SAT.

The playback picutres can be given a softer look. OFF: The playback pictures appear softer. ON: Regular mode

Internal timer recording does not operate when the

#### **MENU SCREEN 5**

The internal timer recording modes are set on Menu Screen 5.

Internal timer recording mode setting (see page

This sets the weekly timer or daily timer recording mode. (OFF/ON)

OFF: Internal timer recording is not set.

ON: Internal timer recording is set.

#### **MENU SCREEN 6**

The summer time mode is set on Menu Screen 6.

 Selecting the summer time mode. Select the summer time mode. ON: The summer time mode is selected.

OFF: The summer time mode is not selected.

Setting the start time for the summer time mode Set the week, month and hour at which the summer time mode is to start.

WEEK: Select 1ST, 2ND, 3RD, 4TH or LST (last) and one of SUN through SAT

MONTH: Select the starting month (1 - 12). TIME: Select the start time (1:00 - 22:00)\*.

**TIME:** Select the end time  $(1:00 - 22:00)^*$ . \* Minutes are for reference only and cannot be adjusted.

MONTH: Select the ending month (1 - 12).

Setting the end time for the summer time mode

Set the week, month and hour at which the

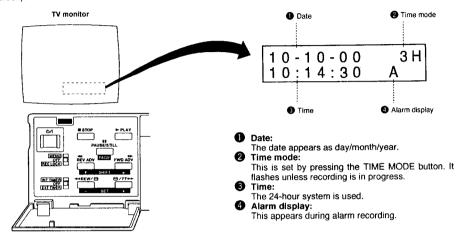
WEEK: Select 1ST, 2ND, 3RD, 4TH or LST (last)

#### CAUTIONS:

- The menu screens are not displayed while the unit is playing back a tape.
- · While the unit is recording, the contents of Menu Screen 1 can be changed; however, Menu Screens 2 to 6 are for reference only and therefore cannot be changed.

## **Date and Time Settings**

This unit comes with a time/date generator which enables the date and time to be superimposed on the recording. When the power is switched on, the date, time of the day and time mode are displayed (in the case of a regular screen).

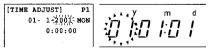


Example: Setting the date and time to Saturday, March 3, 2001 at 3:25. The time mode is set to 24 hours.

Set the MENU/REC LOCK switch to MENU, Menu. Screen 1 appears, and the year digits flash.

Monitor display	Display area	
[TIME ADJUST] P1 01- 1-2000 SAT 0:00:00		

2 Press the SET (+, -) buttons to set the year to

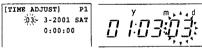


When the shift (►) button is pressed, the month

Press the SET (+, -) buttons to set the month to



 When the shift (►) button is pressed, the day digits flash. Press the SET (+, -) buttons to set the day to



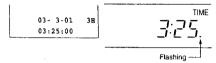
- . The year can be set from 2000 to 2079.
- When the shift (▼) button is pressed, the hour digits flash. Press the SET (+, -) buttons to set the hour to "3".



6 When the shift (►) button is pressed, minute digits flash. Press the SET (+, -) buttons to set the minutes to "25".

[TIME	AD	JUST]	P1	TIME
	03-	3-2001 3 \$25€0		325

When the MENU/REC LOCK switch is set to OFF, the clock automatically starts running from time and date set.



For the seconds, "00" is set. Even when the switch is set to MENU, the time will keep advancing if it has not been changed.

- To clear the date and time display, set POSITION under (DISPLAY) on Menu Screen 2 to OFF.
- Even if the power should fail for a period of up to one week, the date, time and time mode display (internal timer setting alarm recall) data are stored in the memory (but only if power has been supplied continuously to the unit for 3 or more days). When the unit has just been purchased or when it has not been used for a long time, the data is not stored in the memory and the display shown below appears.

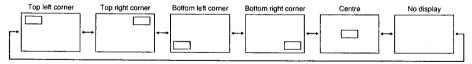


All the internal timer settings are set to OFF, and the alarm recall display is cleared.

- · For the date setting, the unit automatically adjusts for leap years.
- Due to temperature fluctuations and other factors, the clock time may run fast or slow with a monthly error of up to ±60 seconds. This is not indicative of malfunctioning. Reset the time at regular intervals.
- When the time is reset to "0:00:00" as described, check the menu settings. If any of the settings are incorrect, please set them again.

## **Time/Date Display Position**

The position of the date and time displays on the TV monitor changes as shown below when (DISPLAY) on Menu Screen 2 is changed.



Set the MENU/REC LOCK switch to MENU to display to menu screens. Press the page button to display Menu Screen 2 on the TV monitor.

POSITION : Y-UPPER

Press the set (+, -) buttons to position the display as desired.

POSITION : L-BOTTOM

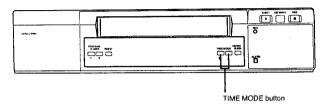
Upon completion of the settings, set the MENU/ REC LOCK switch to OFF. The regular screen is restored, and the date and time appear at the selected position.

#### TIME/DATE display position adjustment function

When the unit is in STOP or EJECT mode, the position of the displayed time/date can be adjusted by pressing the TRACKING (-) or TRACKING (+) button.

- Pressing the TRACKING (--) button moves the position vertically. (Pressing the button 3 times will return the display to its original position.)
- Pressing the TRACKING (+) button moves the position horizontally. (Pressing the button 3 times will return the display to its original position.)
- Pressing the (-) and (+) buttons simultaneously will return the display to its original position (factory setting).

### **Time Mode Selection**



Refer to the table given below to select the mode that suits the intended purpose of use.

Mode		enable time ours)	Tape replacement standard	Video recording interval	Audio recording	Type of tape travel
	180-minute 120-minute tape tape	180-minute 120-minute (recording (in	(in seconds)	recording	iapo navoi	
3H	3	2		1/50	Possible	Continuous travel
6H	6	4		1/50	Possible	Continuous travel
12H	12	8	50	0.1	Possible	Continuous travel at low speed
24H	24	16	50	0.18	Possible	Continuous travel at low speed

#### Notes on operation

- This unit is designed with the NV-E180 cassette tape as a reference.
- Depending on the type of video cassette used, the recordable time will differ.
- The actual recording enable time will be slightly longer than the "Recording enable time" given in the above table although this will depend on the tape used.
- For instance, it is possible to record for about 27 hours using a 180-minute tape in the 24H mode.
- The 12- and 24-hour modes are time lapse modes. Pictures are recorded with frames skipped to enable lengthy recording and playback.
- A tape recorded in a time lapse (12-/24-hour) mode can be played back in quick motion in the 3-hour mode.
- A tape recorded in the 3-hour mode can be played back in slow motion using the time lapse (12-/24-hour)
- · A tape recorded in the 6-hour (or 3-hour) mode cannot be played back in the 3-hour (or 6-hour) mode.
- A tape recorded in the 6-hour (or 5-hour) indee carried be played back in the 5-hour (or 6-hour mode).
   When a tape recorded on the 6-hour mode is played back in another mode, colour programme is played back in black and white, but this is not a malfunction.
- (With still picture, field FWD ADV and field REV ADV operations, the colours at the top of the screen may disappear at some tracking positions, but this is not a malfunction.)
- Tapes recorded on this machine cannot be played back other VHS video recorder as they are not compatible.

#### Selecting the cassette tape

The unit is designed as a product required to exhibit high reliability in surveillance, security, monitoring, etc. In
order to maintain its recording reliability, it is recommended that the Panasonic video tapes listed below be used.

<VHS tapes>

- NV-E180
- NV-E120NV-E90
- NV-E60
- · Avoid using 240-minute tapes with this unit.

## **Recording Procedure**

- Switch on the power to the connected equipment.
- Adjust so that the images of the video cameras appear properly on the TV monitor.
- Check that the date and time displayed on the TV monitor have been adjusted properly.
- Insert a cassette tape into the unit after checking that the tab on the cassette is intact.
- Set the timer recording, auto repeat recording, alarm recording, restoration-of-power-after-failure recording or other recording function.
- 6 Select the time mode for the recording.
- Press the REC button.

#### Notes on operation

- If the PAUSE/STILL button is pressed during recording, the unit is set to the pause mode, and after about 5
  minutes in this mode it is transferred to the stop mode.
- Neat frame-to-frame continuity is not achieved if the recording mode is set again after the PAUSE/STILL button is pressed during recording.
- When the MENU/REC LOCK switch has been set to OFF, other operations can be performed during recording.
- When restoration-of-power-after-failure recording is performed recording can be continued in the same time mode
  even if the power should fail provided that the power is restored within about one week. (This applies only if
  the power has been supplied continuously for 3 or more days.)
- · When performing auto repeat recording or timer recording, do not neglect to conduct the routine inspections.
- . When recording images from a black-and-white camera, set the video signal mode on Menu Screen 4 to B\_W.
- Remove the cassette tape if the unit is to be left standing for a prolonged period of time.
- When the power supply is interrupted during recording (with the O/I switch still ON), a non-recorded portion will be made in the beginning of the tape travel, or the tape will be over-recorded at its ending section. This is not a malfunction.

## **Tips For Better Recording**

In order to ensure greater reliability in monitoring, surveillance and other continuous operations lasting many hours, this unit comes with some safety functions for recording. Read the following descriptions of these functions before proceeding to operate the unit.

#### Recording mode lock

There are two ways, as described below, to maintain the recording mode during recording by disabling the operations of the dyl switch as well as the TIME MODE and operation buttons.

- Set the MENU/REC LOCK switch to REC LOCK.
- 2 Set REC LOCK on Menu Screen 1 to ON. (See Note)

The following button and connectors are operational during recording even if the unit is set to REC LOCK.

- Alarm input connector, alarm reset connector
- REC REVIEW

#### Recording check

When the REC REVIEW button is pressed during recording, the tape runs temporarily in the reverse direction, and the recorded section is played back. This function can be used to check the daily operation of the equipment in the system.

## Restoration-of-power-after-failure recording

When a power failure has occurred during recording, the unit automatically starts recording if the power is restored within approximately one week.

 When the power fails, the tape "loss" safety protection function is activated to protect the video heads and video tape.

Before power is restored	After power is restored
Stop, play, fast forward	Stop mode is established.
Recording	Recording mode is established.
Auto rewind     Auto rewind during auto repeat recording	Unit is returned to the mode applying before the power failed.

#### Notes:

- When the power cord has come out of the socket or a power failure has occurred, no operations will be acknowledged for about 30 seconds after the power has been restored: this is to protect the tape.
- Once the recording mode is established, recording cannot be released until REC LOCK on Menu Screen 1 is set OFF.

## **Timer Recording**

There are two methods of timer recording: one uses the internal timer and the other uses an external timer.

#### Internal timer recording

#### Start time and stop time

Bear in mind the following points when setting these times.

 When the stop time is set later than the start time: Recording will commence at the start time on the day concerned and stop at the end time on the same day.

Example: 8:30 → 17:00

 When the start time is set later than the stop time or the start time and stop time for weekly recording (weekly timer) are the same:

Recording starts at the start time on the day concerned and ends at the stop time on the following day.

Example: 17:00 → 8:30

 When the start time and stop time are the same (for weekly recording):

Recording starts at 8:30 on the day concerned and ends at 8:30 on the following day.

Example: 8:30 → 8:30

To record for an entire day, set the start time and stop time to 0:00.

#### Notes:

- Weekly recording (weekly timer) can be set by the day of the week.
- When (INTERNAL TIMER REC) on Menu Screen 5 is set to OFF for both the weekly timer and daily recording (daily timer), nothing appears for the start or stop time. Timer recording is considered not to be set.

#### Internal timer recording operation

- Check that a video cassette with its tab intact has been inserted.
- Check that the TV monitor shows the correct present time.
- Set the MENU/REC LOCK switch to MENU to display the menu screens. Press the page button so that the INTERNAL TIMER REC timer setting screen appears on the TV monitor.

[INT	ERNAL TIM	ER REC]	P5
(TII	MER] START	END	T-M
SUN	OFF		
MON	OFF		
TUE	OFF		
WED	OFF		
THU	OFF		
PRI	OFF		
SAT	OFF		
DLY	OFF		

#### VTR operations after the settings

- The unit is in STANDBY mode, and even if other buttons are pressed, their operations are not accepted.
- When the start time and stop time have not been set, INT flashes on the display.
- Alarm recording is performed in the event of an alarm input even when the unit is in the timer recording standby mode. When alarm recording is completed, the unit is set to the timer recording standby mode.
- Even when the power should fail, the start and stop times set for timer recording are stored in the memory provided that the power is restored within a week or so (but only if power has been supplied continuously to the unit for 3 or more days).
- When the unit has just been purchased or when it has not been used for a long time, the start and stop times are not stored in the memory.

#### Releasing the internal timer mode

Set the TIMER MODE switch to OFF to clear INT on the display.

#### Note:

 Since it takes some moments for recording to start, set the start time for timer recording one minute earlier.

4 Set the operation times of the internal timer.

- For details on the settings, refer to the sections on "Daily timer" or "Weekly timer." (See page 17)
- Upon completion of the settings, set the MENU/ REC LOCK switch to OFF. The regular screen is restored.
- Set the TIMER MODE switch to INT TIMER so that INT lights on the display.

When the time and date for Menu Screen 1 have not been set, a cassette has not been inserted, the timer has not been set, or when a cassette with a broken out tab has been inserted, the buzzer sounds and INT flashes on the display.

#### Daily Recording (Daily Timer)/Weekly Recording (Weekly Timer)

**Example:** When recording from 8:30 to 12:00 from Sunday through Thursday and from 9:00 to 12:00 on Fridays and Saturdays

Check that OFF or ON for Sunday (SUN) is flashing. If the setting is OFF, press the set (+, -) buttons to display ON.



When the shift (►) button is pressed, the setting moves to the start time and the "hour" digits flash.

3 Press the set (+, -) buttons to display "8."

When the shift (►) button is pressed, the "minutes" digits flash.

Press the set (+, -) buttons to display "30."

6 When the shift (►) button is pressed, the "hour" digits flash.

Press the set (+, -) buttons to display "12."

When the shift (►) button is pressed, the "minutes" digits flash

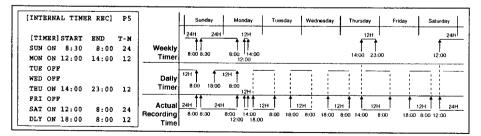
Press the set (+, -) buttons to display "00."

Press the shift (►) button and set the recording time mode. When the shift (▼) button is pressed, the MON is flashing.

Following the same procedure in steps 1 to 10, display the start time of "8:30" and stop time of "12:00" from Monday (MON) through Thursday (THU). Following the above procedure, set the times for Friday (FRI) and Saturday (SAT) as well. In this way, the timer operation times have been set for each day of the week.

The settings for daily recording (daily timer) are also performed following the same steps 1 to 10.

 The setting shown on the screen at the left translates into the weekly and daily timer recording combinations shown below which, in turn, means that the actual recording time on the tape is shown at the bottom.



- The day of the week time settings are displayed, enabling the settings to be checked for each day of the week.
- Proceed with the setting due consideration given to the total recording time since a 180-minute tape is long enough to provide recording for up to 24 hours only.

## **Timer Recording**

#### **External Timer Recording**

The unit can be made to record using an external timer to turn on its power.



#### External timer recording operations

- Check that a video cassette with its tab intact has been inserted.
- Set the TIMER MODE (REC MODE) switch to EXT TIMER so that EXT lights on the display. At the set time, power is supplied from the external timer and the unit is set to the recording mode.
- If the video cassette tape has not been inserted or if its accidental erasure prevention tab has been broken, EXT will flash on the display, and external timer recording cannot be conducted.
- Since it takes some moments for recording to start, set the start time for timer recording one minute earlier.
- Depending on the tape position, some of the images at the start of the external timer recording may not be recorded or may record over the images at the end of the previous external timer recording.

## **Auto Repeat Recording/Auto Rewinding**

Auto repeat recording: This function automatically rewinds the cassette tape when its end is detected in the recording mode, and it repeats recording from the start of the tape.

Auto rewinding: This function automatically rewinds the tape to the start when the tape end is detected in the recording mode.

- Check that a video cassette with its tab intact has been inserted.
- Set the MENU/REC LOCK switch to MENU to display the menu screens. Press the page button to display Menu Screen 4 on the TV monitor.



Press the shift (▼) button to move the flashing to TAPE END. Press the set (+ or -) button to display REPEAT for auto repeat recording or REW for auto rewinding.

- 4 "R" lights on the display.
  - If auto rewinding has been selected, "R" is cleared.
- Upon completion of the settings, set the MENU/ REC LOCK switch to OFF. The regular screen is restored.

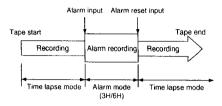
#### lotes of operation

- When auto repeat recording is to be performed, do not neglect the routine inspections. Since the image deteriorates when the same tape is used over and over again for auto repeat recording, replace the tape with a new one after about 50 recordings.
- Alarm signals are not accepted during auto rewinding, and so alarm recording is not performed.
- If an alarm signal is supplied during auto repeat recording, the alarm recording mode is established. If the tape then reaches its end, auto repeat recording is performed but alarm recording is released.
- When the power cord has come out of the socket or a power failure has occurred, no operations will be acknowledged for about 30 seconds after the power has been restored; this is to protect the tape.

## **Alarm Recording (Emergency Recording)**

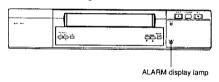
When an emergency occurs at the monitoring site during prolonged monitoring and recording, the alarm function is automatically triggered, and alarm recording is performed.

#### Principle of alarm recording



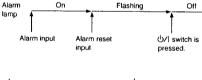
 When an alarm signal is supplied by an alarm sensor (door or intercom switch, etc.) during recording in a time lapse mode, the recording speed is switched to the 3- or 6-hour mode and the details of the state of emergency are faithfully recorded.

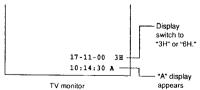
## Alarm and display methods during alarm recording



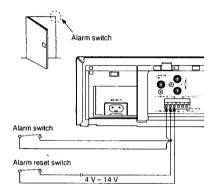
OPE-8

 When an alarm signal is supplied, the alarm display lamp functions as follows.





## Connecting the alarm input connector

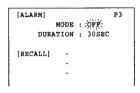


- Alarm recording starts when the alarm switch is set on. When the alarm reset switch is set ON after recording has started, alarm recording is released and operation is returned to the original time lapse recording mode.
- Alarm recording can be released by pressing the STOP button during alarm recording.
   However, it cannot be released even by pressing the STOP button if the MENU/REC LOCK switch is at REC LOCK or INT is lighted on the display.
- Alarm recording can be automatically reset without supplying the alarm reset input signal.
   The reset time can be set for 30 sec., 1.0, 2.0, 3.0, 5.0 or 10 minutes.
- Another option is alarm recording only while the alarm input signal is supplied.
- Alarm recording is also possible as far as the end of the tape.

## **Alarm Recording (Emergency Recording)**

#### Alarm recording operation

- Check that a video cassette with its tab intact has been inserted.
- Set the MENU/REC LOCK switch to MENU to display the menu screens. Press the page button to display the alarm recording setting screen (Menu Screen 3) on the TV monitor.



Press the set (+ or -) button to display 3H or 6H for MODE.

MODE 3H

- Press the shift (▼) button to move the flashing to DURATION.
  - Press the set (+ or -) button to set the recording duration.
- Upon completion of the settings, set the MENU/ REC LOCK switch to OFF. The regular screen is restored.
- Press the REC button. If an alarm input signal is subsequently supplied, the time mode set by T-MODE changes to 3H or 6H, and alarm recording continues until the alarm is released.

- If TAPE END on Menu Screen 4 has been set to REPEAT, the auto repeat recording mode is established when the tape comes to the end.
- · With emergency recording, set the unit to the STANDBY or STOP mode.

#### Alarm Recall

The time when the alarm signal was input can be ascertained on the TV monitor by checking the alarm input time in the RECALL item on Menu Screen 3.

- Set the MENU/REC LOCK switch to MENU to display the menu screens. Press the page button to display the alarm recording setting screen (Menu Screen 3) on the TV monitor.
- Upon completion of the settings, set the MENU/ REC LOCK switch to OFF. The regular screen is restored.



- The alarm recall function stores up to 4 alarm input times in the memory and displays them on the screen. If there have been more than 4 inputs, they will be deleted from the screen in sequence starting with the oldest
- When the RESET button is pressed while Menu Screen 3 is on the display, the alarm recall memory can be cleared.

## **Playback Procedure**

Before operating the unit, check that the internal/external timer recording displays (INT/EXT) have been cleared from the display. (If INT or EXT is displayed, set the TIMER MODE switch to OFF to clear it.)

Switch on the power to the unit and TV monitor.

4 Press the PLAY button.

2 Insert the recorded cassette tape into the unit.

3 Select the time mode.

#### Notes on operation

- 1. Bear in mind the following points when playing back parts of a tape recorded in a time lapse (12-/24-hour) mode.
- When the tape is played back in the same mode, noise resembling dropouts will appear on the screen: this
  is not indicative of malfunctioning.
- The picture may oscillate in the vertical direction; this is not indicative of malfunctioning.
- When a tape is played back in the same time mode, the picture may shake slightly sideways: this is not
  indicative of malfunctioning.
- Turn Quasi-V insertion ON ([]>) or OFF ( > ) with the FWD ADV button. Dancing can be minimized when a
  tape is played back in a time lapse (except 3- or 6-hour) or linear slow mode. Moreover, playing back a tape in
  a system featuring a frame switcher enables the appearance of the pictures of other cameras to be reduced.
- 2. Bear in mind the following points when playing back parts of a tape recorded in a VHS mode (3 or 6 hours).
- When a tape is played back in a time lapse mode, slight noise may appear at the top and bottom of the screen: this is not indicative of malfunctioning.
- When the tape is played back in the 12H or 24H mode, the picture may oscillate in the vertical direction: this is not indicative of malfunction.
- When a tape recorded on the 6-hour mode is played back in another mode, colour programme is played back in black and white, but this is not a malfunction.
- When noise has occurred during still-picture playback, press the FWD ADV button to play it out. (It may not always be possible to play out the noise.)
- 4. Bear in mind that if the power cable is disconnected and then re-connected or if the power has been restored after it has failed when the tape was played with EXT indicated on the display by the TIMER MODE switch, the unit will automatically be set from playback to the recording mode.
- 5. When the PAUSE/STILL button is pressed during playback, the unit is set to the pause mode, and a still picture will appear on the monitor screen. To release this state, press the PAUSE/STILL button again or press the PLAY button. If the unit is kept in the pause mode for more than 5 minutes, it will be set to the stop mode.
- If the horizontal AFC on the TV monitor is too long or when a video camera with random interlace scanning has been used, the top area of the TV monitor may be distorted: this is not indicative of malfunctioning.
- 7. Tapes recorded on this machine cannot be played back other VHS video recorder as they are not compatible.
- 8. When the power cord has come out of the socket or a power failure has occurred during fast forwarding or rewinding, no operations will be acknowledged for about 30 seconds after the power has been restored: this is to protect the tape.

#### Tracking

When noise such as that shown below appears on the playback image in the 3- or 6-hour time mode, press the tracking (+ or --) button to minimize the noise.





- For the tracking default setting, press the "+" and "-" buttons together (in the 3- or 6-hour time mode only).
- In the 12- or 24-hour mode, press the "+" or "-" button to adjust the tracking.

#### Vertical hold adjustment

If the image shakes slightly in the vertical direction during still-picture playback, press the V-LOCK buttons (-, +) to reduce the dancing.



 If the TV monitor has a vertical hold control, adjust that control also.

## **Routine & Regular Inspection Request**

This unit is designed to withstand many hours of operation. Nevertheless, it is recommended that routine inspections be conducted to help ensure trouble-free operation.

#### CAUTION

Do not forget to conduct the routine inspection with auto repeat recording.

#### Routine inspection procedure

- Set the power switches on the unit, video cameras, TV monitor and other equipment connected in the monitoring system to the ON position.
- 2 Is the picture on the TV monitor OK?
- 3 Are the date and time displayed on the TV monitor correct?
- Press the REC REVIEW button during the recording and check that the image are being recorded correctly.

#### Action taken after routine inspections

In the unlikely event of a problem with the unit, turn the unit to STANDBY mode, take hold of the power plug and disconnect it from the power outlet, and consult with the dealer from whom the unit was purchased.

#### Regular inspections recommended

This unit has an hour meter which shows for how many hours the VTR has been used. When the MENU/REC LOCK switch is set to MENU, Menu Screen 1 appears on the TV monitor, and the hour meter can be checked. Use the hour meter as a rough guideline to cleaning or replacing the parts inside the unit. The regular screen is restored when the MENU/REC LOCK switch is set to OFF. For further details, consult with your dealer.



## **Troubleshooting**

No powe	er.	Is the power plug inserted properly into the AC outlet?
No pictu	ire.	Is the unit connected properly with the TV, video cameras, etc.     Are any of the connecting cables making faulty contact?
Indistino	et picture.	<ul> <li>Has the focus on the video cameras been adjusted correctly?</li> </ul>
	Trouble	e with functions or operation
	happens even when operation are pressed.	<ul> <li>Is the video cassette loaded?</li> <li>Is the MENU/REC LOCK switch at OFF?</li> <li>Has the video cassette been inserted properly? Press the EUECT button to eject the cassette and insert properly.</li> <li>Has INT lighted on the display?</li> </ul>
" <b>d</b> " ma	ark is flashing.	<ul> <li>The unit will not operate because its safety protection function has been triggered. Wait until the flashing disappears.</li> </ul>
In case of moisture detection:  The "d' mark at display section flashes.		Ejection will remain incomplete when a video Wait until the "d" mark goes out with dy's switch
		cassette has been inserted. turned "ON". It may take a few hours, although it depends upon conditions.

Date and time display data has not been stored in memory when the power failed.

 Has the unit's power plug been disconnected from the power outlet for a long time?
 Insert the unit's power plug into the power outlet and supply power continuously for at least 3 days to the unit.

### Trouble with recording

Tape can be played, fast forwarded or rewound but not recording results.	Is the tab on the video cassette broken?
Recording has stopped.	<ul> <li>Is the video cassette tape at its end?</li> <li>Have more than 5 minutes elapsed since the PAUSE/STILL button was pressed during recording?</li> <li>Are the routine inspections being carried out? If this phenomenon keeps recurring, it means that some failure or other is to blame. Consult with your dealer.</li> </ul>
The power has been restored after a power failure but recording does not automatically resume.	<ul> <li>Has the power failure lasted a long time (more than 1 week)?</li> <li>Set the timer recording switch to EXT to ensure that the unit is set to the recording mode even after a prolonged power failure.</li> </ul>
Recording cannot be stopped.	First set the MENU/REC LOCK switch to OFF and then operate. Is REC LOCK on Menu Screen 1 at OFF?
1-week programmed timer recording cannot be conducted properly.	Are the date and time on the regular displays correct? (See page 12)
One or more cameras do not record when a multiple number of cameras are used.	<ul> <li>Turn the time adjustment control on the frame switcher, and adjust it to a setting which is longer than the video recording duration in the recording time mode.</li> <li>Connect a camera switching cable between the unit and frame switcher.</li> </ul>
No auto repeat recording.	Has the stop button been pressed during auto rewinding?

## **Troubleshooting**

No timer recording.	Are the present time and start/stop times for the timer recording correct?     Has INT or EXT lighted on the display?
No alarm recording.	Have the alarm sensors and alarm input connectors been connected properly?     Has the alarm recording mode been selected on Menu Screen 3?
Ti	rouble with playback
Noise sometimes appears on the play- back pictures.	Adjust the tracking buttons. (See page 21)
Dirty playback picture.	<ul> <li>The video heads may be dirty or clogged or they may have reached the end of their service life. Consult with your dealer.</li> </ul>
"Snow" on playback picture.	<ul> <li>The video heads may be dirty or clogged. Consult with your dealer.</li> </ul>
While a multiple number of cameras are being used, two scenes appear as the playback picture when the cameras are switched.	<ul> <li>Has the camera switching signal cable been connected properly?</li> </ul>
Recording starts when the unit's power plug is connected to or disconnected from the power outlet.	Has INT or EXT lighted on the display?
No playback because recording starts when the main power for the connected equipment is set to ON.	Has INT or EXT lighted on the display?

#### Input/Output Terminal Signal Level

Terminal	Signal Level	Note
Alarm Input/REC IN	VII.: 0 – 0.6 V MIN 400 msec.	LOW Input
Alarm Reset Input	MIN 400 msec. ViH; 4 - 14 V	HIGH Input
Camera Switching Output	Video recording interval  ViH: 11 – 13 V  Vim. vi – vi	V <sub>OH</sub> = 11 - 13 V (5.6 kΩ) V <sub>OL</sub> = 0 - 0.6 V (max. 3 mA)
Tape end output	During auto repeat or auto rewinding VoH VoL VoL Approx. 10 sec	Vo <sub>H</sub> = 11 – 13 V (4.7 kΩ) Vo <sub>L</sub> = 0 – 0.6 V (max. 3 mA)
Warning output	VOH:11 – 13 V	Vo <sub>H</sub> = 11 - 13 V (4.7 kΩ) Vo <sub>L</sub> = 0 - 0.6 V (max. 3 mA)

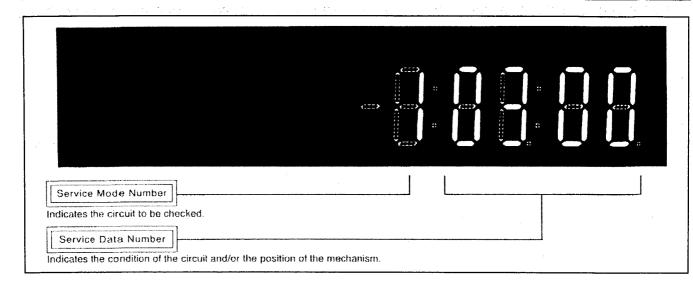
## SECTION 2

## **SERVICE INORMATION**

## **CONTENTS**

1. SERVICE INFORMATION DISPLAY	
1-1. Purpose of Service Information Display	
1-2. How to display Service Information1-3. Use of Service Modes	
2. AUTO OFF AND ERROR MESSAGE	INF-5
3. CHEKING OF MAIN C.B.A	INF-6
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4-2. Removal of manual operation of Main cam gear	
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## 1. SERVICE INFORMATION DISPLAY



### 1-1. Purpose of Service Information Display

This is information to aid trouble shooting by indicating the source of the malfunction. The service mode number & service data number are used by the technician for repair.

### 1-2. How to display Service Information

Press the FF and EJECT buttons simultaneously.

In the service Information display, there are five digit numbers divided into 3 functions.

The first digit indicates service mode that the unit is currently in.

- MODE 1: Check tape protection circuit.
- MODE 2: Check tape transport mechanism.
- MODE 3: Indicate the most recent fault indication code.
- MODE 4: Indicate the second recent fault indication code.
- MODE 5: Indicate the third recent fault indication code.
- MODE 6: Check cylinder motor and capstan motor.
- MODE 7: Check loading/unloading mechanism action.

The second, third, forth and fifth digits are service data 1 and 2 which indicate the condition of the circuit or mechanism.

#### 1-3. Use of Service Modes

- (1) Show Service Information Display.
- (2) To change Service modes, press the FF and EJECT buttons simultaneously.
- (3) Mode 0: Indicate VCR mode and process number
- (4) Mode 1:
  - Service Data 1: Checks the sensor LED, Supply & Take-up sensor circuits by blocking the light from the sensor LED to either or both Supply & Take-up sensor.

When the light is blocked to both sensors, "00" should be indicated on the service data number.

When the light is blocked to the supply sensor, "01" should be indicated.

Service Data 2: Indicate the code if the microprocessor receives the operating commands from the mode button

and/or remote controller.

- (5) Mode 2:
  - Service Data 1: Check the mode switch circuit while indicating mechanism position.

    Service Data numbers indicate the position of the mode switch as the mechanism position.
  - Service Data 2: Indicate control command to cylinder unit, capstan unit and loading motor unit.
- (6) Mode 3:
  - Service Data 1: The most recent fault indication code is displayed.

Service Data 2: Indicate complementary data (VCR mode, mechanism position and so on) for the most recent fault indication code.

(7) Mode 4:

Service Data 1: The second recent fault indication code is displayed.

Service Data 2: Indicate complementary data (VCR mode, mechanism position and so on) for the most recent fault indication code.

(8) Mode 5:

Service Data 1: The third recent fault indication code is displayed.

Service Data 2: Indicate complementary data (VCR mode, mechanism position and so on) for the most recent fault indication code.

(9) Mode 6:

Service Data 1. Check cylinder motor circuit.

Indicate if the system control IC has received the command to rotate the cylinder motor.

Service Data 2: Check capstan motor circuit.

Indicate if the system control IC has received the command to rotate the cylinder motor.

(10)Mode 7: Check the loading/unloading mechanism action.

The loading motor rotates for loading when the "PLAY" button is pressed.

The loading motor rotates for unloading when the "STOP" button is pressed.

This mode can be displayed until the POWER button is pressed.

Camilaa Mada			Service Data 1	Service Data 2		
Service Mode Number	Note for checking Service Data Numbers	Service Data Numbers	Indication	Service Data Numbers	Indication	Remarks
	Service Data 1: For checking supply/ Take-up photo sensor. Service Data 2: For checking operating button.	00 01 02 03	No light detected at either sensor Tape beginning Light to Supply photo sensor is blocked. Tape end Light to Take-up photo sensor is blocked. Light to Take-up to sensor is blocked. Light detected at both sensors.		Display only when the operating button is pressed.	Tape not required.
2	Service Data 1: For checking mechanism mode position. Service Data 2: For checking cylinder, capstan and loading motor.	00 01 02 03 04 05 06	EJECT Cassete down REV, REV SLOW Loading/Unloading PLAY, REC, STILL, PAUSE, CUE FWD SLOW, STOP3*1 STOP*2 FF/REW Intermediated position	0*, 2*  1* 3* 8*, A* 9* B* *0 *1 *2 *3	Cylinder OFF, Capstan ON (FWD) Cylinder OFF, Capstan ON (RVS) Cylinder ON, Capstan OFF Cylinder ON, Capstan ON (FWD) Cylinder ON, Capstan ON (RVS) Mode OFF Loading Unloading Break (loading + unloading) Note: Left digit indicates cylinder and capstan unit condition, Right digit indicates loading.	1
	Service Data 1: Indicates the most recent fault indication code (Self-test indication display). Service Data 2: Indicates complementary data (VCR mode, mechanism position mode and so on) for fault indication code.	11 01	Dew formation.  Cylinder clogs during PLAY mode.  After cylinder lock is detected, the cylinder does not start rotating again even after tape unloading.  Cassette tape is not wound up during tape unloading except EJECT mode.	•	Left digit: Indicates VCR mode. 0:STOP, 1:EJECT, 2:REW, 3:FF, 4:REV, 5:CUE, 6:SLOW, 7:POWER OFF, 8:PLAY, 9:STILL, A:REC, B:REC PAUSE, C:ADUB, D:ADUB PAUSE, E:INSERT, F:INSERT PAUSE	
3		04 05 06	Mechanism locks during mode transition except EJECT mode.  Mechanism locks during tape loading.  Cassette tape is not wound up during tape unloading in EJECT mode.  Mechanism locks after tape unloading in EJECT mode.  During recording mode recording signal is		Right digit: Tape position, waiting mode position and supply reel pulse counting value are indicated. Fault indication number 03, 04, 06: Indicates waiting mechanism position. Fault indication number 05, 16, 17, 18: Indicates tape position that is indicated in hexadecimal. Fault indication number 15:	
		08 15 16	less than the rormal condition.  Recording circuit works except recording mode.  Tape is not loading in cassette in mode.  Cylinder lock detection.  Supply reel mechanism lock detection.  Take-up reel mechanism lock detection.		rault indication number 15: Indicates supply reel pulse counting value. The other fault indication codes :No display.	

Service Mode		Service Data 1		Service Data 2			
Number Note for checking Service Data Numbers Service Data Indication Serv			Service Data Indication		Remarks		
	Service Data 1: Indicate the second recent fault indication code (Self-test indication display).  Service Data 2: Indicate complementary data (VCR mode, mechanism position mode and so on) for fault indication code.	01	Dew formation Cylinder clogs during PLAY mode. After cylinder lock is detected, the cylinder does not start rotating again even after tape unloading. Cassette tape is not wound up during tape unloading except EJECT mode.	digit	digit	Left digit: Indicates VCR mode. 0:STOP, 1:EJECT, 2:REW, 3:FF, 4:REV, 5:CUE, 6:SLOW, 7:POWER OFF, 8:PLAY, 9:STILL, A:REC, B:REC PAUSE, C:ADUB, D:ADUB PAUSE, E:INSERT, F:INSERT PAUSE	
		03 04 05	Mechanism locks during mode transition except EJECT mode.  Mechanism locks during tape loading.  Cassette tape is not wound up during tape unloading in EJECT mode.	Left digit	Right digit	Right digit: Tape position, waiting mode position and supply reel pulse counting value are indicated.  Fault indication number 03, 04, 06: Indicates waiting mechanism position.	
5	Service Data 1: Indicate the third recent fault indication code (Self-test indication display). Service Data 2: Indicate complementary data (VCR mode, mechanism position mode and so on) for fault indication code.		Mechanism locks after tape unloading in EJECT mode. During recording mode recording signal is less than the normal condition. Recording circuit works except recording mode. Tape is not loading in cassette in mode. Cylinder lock detection. Supply reel mechanism lock detection. Take-up reel mechanism lock detection. PG shifter automatic adjustment error.			Fault indication number 05, 16, 17, 18: Indicates tape position that is indicated in hexadecimal.  Fault indication number 15: Indicates supply reel pulse counting value. The other fault indication codes :No display.	
	Service Data 1: For checking cylinder unit. Service Data 2: For checking capstan unit. Left digit only, disregard right digit display. Service Data 1: Not used.	1 0 Left Right	1, 3, 5, 7, 9, A, n, and no display indicate that the cylinder motor "ON" command received by system control microprocessor.		Right digit	8, 9, u, A, -, n, L and no display indicate that the capstan motor "PLAY" command received by system control microprocessor.  1, 2, 3, 4, 5, 6, 7 display indicate that the	If a symbol other than those listed displayed, a malfunction in that circuit
6	Service Data 2: For checking capstan unit. Right digit only, disregard left digit display.  Service Data 1: Not used. Service Data 2: For checking capstan unit. Right digit only, disregard left digit display.			Left digit 8 Left digit	Right digit - Right digit	capstan motor "PLAY" command received by system control microprocessor.  8, 9, u, A, -, n, L and no display indicate that the capstan motor "RVS, REW, RVS SLOW" command received by system control microprocessor.	
7	Same as mode 2.		Same as Mode 2.			Same as Mode 2.	

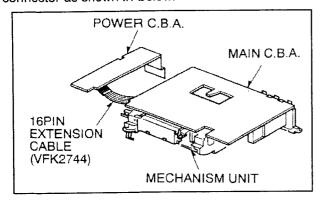
## 2. AUTO OFF AND ERROR MESSAGE

ERROR CODE	CONTENS	CAUSE CONDITION
d	CONDENSATION (DEW)	<ol> <li>If it is in POWER OFF mode, the mode turns to POWER ON and "d" blink indication.</li> <li>If a tape is inserted, the mode turns to half EJECT position and cylinder rotates.</li> <li>Dew condensation continues for about 80 minutes.</li> <li>After released from condensation, if a tape is inserted, the mode turns to STOP.</li> </ol>
E-2	FRONT LOADING LOACKED	<ol> <li>If the motor is locked for about 2-5 seconds during front loading, it is unloaded.</li> <li>After above item1 if it is locked for about 2-5 seconds again, the mode turns to AUTO OFF and "E-2" indication.</li> </ol>
E-3	LOADING LOCKED	<ol> <li>If the motor is locked for about 5 seconds during loading, it is unloaded. Then if it is loaded and locked again, the mode turns to AUTO OFF and "E-3" indication.</li> <li>If the motor is locked for about 2-5 seconds during unloading, the mode turns to AUTO OFF and "E-3" indication.</li> </ol>
E-4	CYLINDER LOCKED	If the motor is locked for about 5 seconds in cylinder rotating mode, the mode turns to AUTO OFF and "E-4" indication.
E-5	REEL LOCKED	If the reel rotation is locked during tape running, the motor in unloaded once. Then if the rotation is locked through the trying to load, the mode turns to AUTO OFF and "E-5" indication.

		NTSC				PAL	
T-MODE	MODE	TAPE SPEED	DET. TIME	T-MODE	MODE	TAPE SPEED	DET. TIME
	PLAY	±1	3.5S		PLAY	±1	3.5S
8H	CUE/REV	±2.5	1.68	3H	CUE/REV	±2.5	1.6S
	CUE/REV	±11,21,27	0.3S		CUE/REV	±7,9,11	0.3S
24H	PLAY	±1	21S		PLAY	±1	3.5S
40H	PLAY	±1	42S	6H	CUE/REV	±2.5	1.6S
					CUE/REV	±11,15,17,19	0.3S
				12H	PLAY	±1	21S
				24H	PLAY	±1	42S

## 3. CHECKING OF MAIN C.B.A.

When Servicing the MAIN C.B.A, take out the MAIN C.B.A. and mechanism from the frame and turn over, and then connect Extension Cable (VFK2744) between the POWER C.B.A. connector and the MAIN C.B.A. connector as shown in below.



## 4. REMOVAL OF CASSETTE TAPE

There are 2 ways to remove a cassette tape.

### 4-1. Removal of compulsory loading.

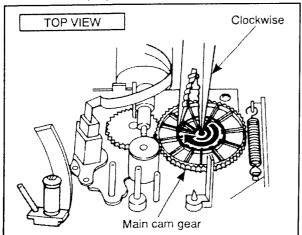
- 1) Press FF and EJECT buttons simultaneously and set the service mode 7.
- Press STOP button in order to unload the mechanism

(Pay an attention to tape slack) Service Mode Indication:

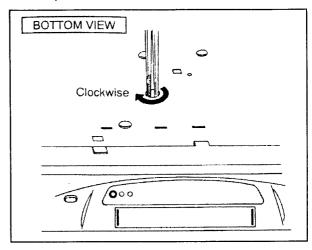
7 ※ ※ ※ ※ (STOP)→7 00 ※ ※ (EJECT)

## 4-2. Removal of manual operation of Main cam gear.

- 1) Disconnect the AC power cord and remove Top Panel.
- Rotate Main cam gear clockwise and unload the mechanism (Tape as remaining)



3) Rotate the Pole of Capstan motor to the clockwise the from the bottom in order to remove the tape slack.



4) Rotate Main cam gear clockwise in order to eject the cassette tape.

## 5. HOUR METER RESET

- 1. Turn OFF power.
- 2. Connect the jumper wire between TP6902 and TP6901 on the Rear Jack C.B.A.
- Set the MENU/REC LOCK switch to REC LOCK side.
- 4. Pressing the TRACKING + and TRACKING buttons simultaneously, then turn ON power.
- 5. Confirm the Time display starts to blink.
- 6. The hour meter reset function is completed when stop the display blinking.

## SECTION 3

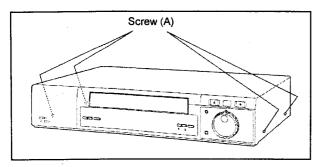
## **DISASSEMBLY PROCEDURES**

## **CONTENTS**

1.	Removal of The Top Cover	DIS-1
	Removal of The Front Panel	
	Removal of The Power Supply C.B.A.	
	Removal of The Front R C.B.A	
	Removal of The Front L C.B.A	
	Removal of The YC SEP C.B.A. (AG-RT650 only)	
	Removal of Mechanism Unit and Main C.B.A	
	Removal of The Rear Jack C.B.A	

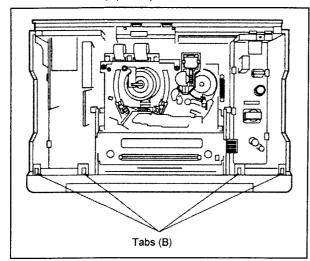
### 1. Removal of The Top Cover

- 1. Remove 4 screws (A) at left & right side.
- 2. Lift up rear portion and remove it.

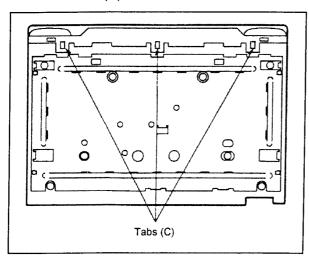


### 2. Removal of The Front Panel

- 1. Remove the Top Cover
- 2. Pull out the JOG dial knob to front direction. (AG-RT650 only)
- 3. Unlock 4 tabs (B) at top side.

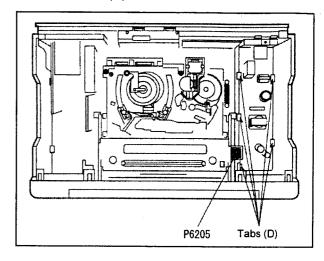


4. Unlock 3 tabs (C) at bottom side and remove it.



### 3. Removal of The Power Supply C.B.A.

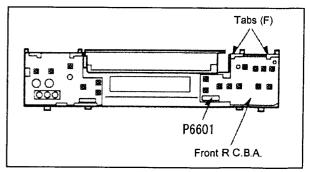
- 1. Remove the top Cover & the Front Panel.
- 2. Disconnect he Bridge connector (P6205)
- 3. Unlock 4 tabs (D)



4. Lift up the metal angle at rear portion and remove it.

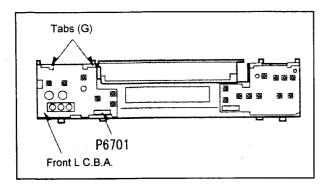
## 4. Removal of The Front R.C.B.A.

- 1. Remove the top cover & Front Panel.
- 2. Unlock 2 tabs (F)
- 3. Disconnect a connector (P6601) from the Main C.B.A..



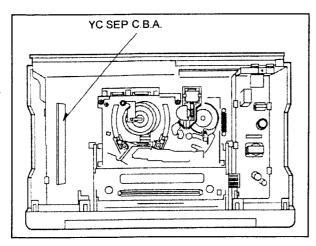
## 5. Removal of The Front L C.B.A..

- 1. Remove the top cover & Front Panel.
- 2. Unlock 2 tabs (G)
- 3. Disconnect a connector (P6701) from the Main C.B.A..



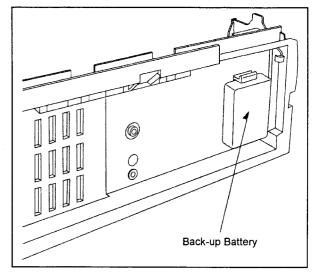
### 

- 1. Remove the top cover & Front Panel.
- 2. Pull out the YC SEP C.B.A..

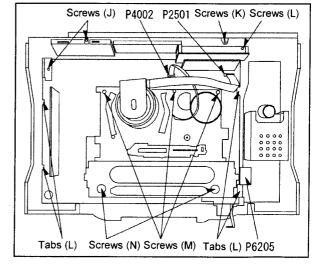


## 7. Removal of Mechanism Unit and Main C.B.A..

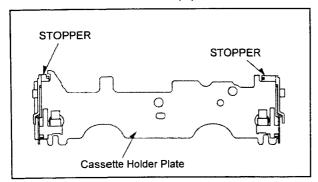
- 1. Remove the top cover & Front Panel.
- 2. Disconnect a connector (P6204) and remove the Back-up Battery.



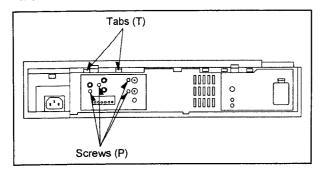
- 3. Disconnect the connector (P6205, P4002 and P2501).
- 4. Remove 2 screws (J), 3 screws (M), screw (K) and screw (L).



5. Keeping pressing 2 stoppers on the Cassette Holder Plate and press the Cassette Holder Plate to rear and remove 2 screws (N).

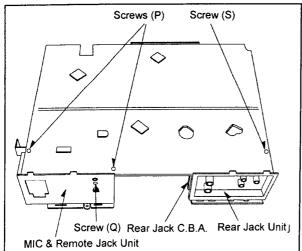


- 6. Remove 3 screws, then press the Earth Plate to rear.
- 7. Carefully lift up the Mechanism unit.
- 8. Unlock 4 tabs (L) and 2 tabs (T), then lift up the Main C.B.A and the both Rear Jack C.B.A..



### 8. Removal of The Rear Jack C.B.A.

 Loosen a screw (Q) and remove 2 screws (R), then remove the MIC & Remote Jack unit from the Main C.B.A..

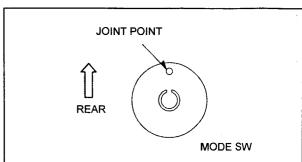


2. Remove a screw (S) and remove the Rear Jack unit from the Main C.B.A..

3. Remove 4 screws (P) and remove the Rear Jack C.B.A. from the Rear jack unit.

Note: Installation method of the Mechanism Unit.

 Confirm the MODE switch position as following figure.



 Make sure fit the CYLINDER cable, Loading Motor connector, FE Head connector, MODE switch and Supply & Take-up Photo unit on the Main C.B.A. to the Mechanism unit.

## SECTION 4

## **MAINTENANCE AND MECHANISM**

## **CONTENTS**

MAINTENANCE	
1. REGULAR MAINTENANCE	
2. CYLINDER UNIT REPLACEMENT	MEC-2
MECHANICAL ADJUSTMENT INFORMATION	
1. TEST POINT	MEC-4
2 SPECIFICATION	

## **Maintenance**

#### 1. REGULAR MAINTENANCE

The purpose of periodic maintenance is to preserve the functioning of this machine throughout its useful life. The user or service dealer should perform these maintenance regularly to ensure that maximum utility is obtained from the machine.

The VCR is a complicated place of equipment. It contains many belts, rollers, heads etc., which become worn, and deteriorate as time goes by, causing trouble. Dust and dirt will also impede the proper functioning of the machine. In light of this, it is very important that overall maintenance is done according to the maintenance chart to maintain the functions of the VCR, and to avoid accidental problems. This maintenance should also be performed after any repairs are done on the equipment.

The VCR used for business applications requires particular attention for several reasons. The installation conditions and applications are not always the best. Long use times, or poor environmental conditions may adversely affect the lifespan and performance of the machine. Regular maintenance assures that the purchaser obtains the maximum value for his expenditure. Accordingly, the necessity of regular maintenance should be fully explained at the time of sale, as well as during after-sale repairs.

#### 1-2. MAINTENANCE CHART

The following periodic maintenance is required to prolong the life of the machine. (24H mode operation)

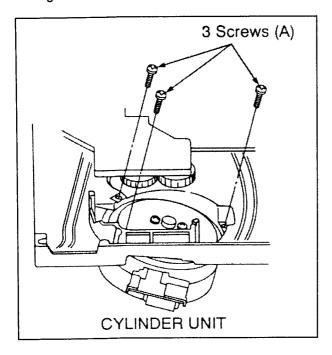
D 4 N	HOUR									
Parts Name	500	1000	1500	2000	2500	3000	3500	4000	8000	12000
Tape Transporters	•	•	•	•	•	•	•	•	•	•
Upper Cylinder U	•	•	•	•	•	•	•	0	0	-
Cylinder U	•	•	•	•	•	•	•	•	•	0
Capstan U	•	•	•	•	•	•	•	0	0	0
FE HEAD	•	•	•	•	•	•	•	•	•	0
A/C Head U	•	•	•	•	•	•	•	•	•	0
Supply & Take Up Reel Table	•	•	•	•	•	•	•	•	•	Δ
Capstan Belt	•	•	•	•	•	•	•	0	0	0
Loading motor U										0
Brake Arm U										0
Cleaner Arm U		·						0	0	0
Tension Arm U										0
Pinch Arm U								0	0	0
Inclined Base (S) U						-				⊚∎
Inclined Base (T) U										<b>⊚</b> ∎
Main Cam gear										<b>©</b> □
Mode SW										0
Detection SW										0
Earth Plate										0
P5 Arm U										0
Center Clutch										0
ldra arm U										0
Convent Gear										0

Symbol	Maintenace	Requirement	Remark
•	Cleaning	Ethyl-alcohol or Ceaning Liquid (Purchase locally)	Wipe dirt from the parts using soft cloth impregnated with Etyl-Alcohol.  Note: When cleaning rubber parts, avoid using excessive alcohol since it may accelerate deterioration of these parts.  After cleaning with alcohol, wipe the alcohol quickly and thoroughly.
· ©	Replacement		*****
Δ	Lubication	High Quality spindle Oil (VFK0131)	Supply one or two drops of oil.
	Greasing	Molytone Grease (MOR265)	Wipe the old grease and apply new grease.
	Greasing	Foil Grease (VFK1298)	Wipe the old grease and apply new grease.

### 2. CYLINDER UNIT REPLACEMENT

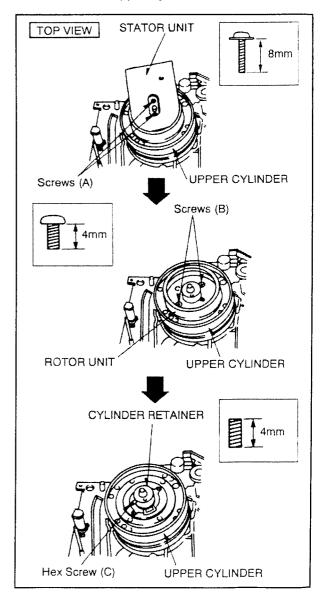
### A. CYLINDER UNIT REPLACEMENT

Remove the 3 Screws (A) of the CYLINDER UNIT with a magnetized screw diriver.



## B. UPPER CYLINDER DISASSEMBLY

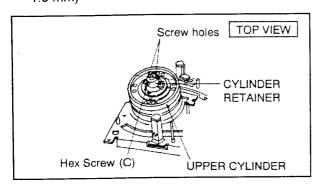
- 1. Remove 2 screws (A).
- 2. Remove the Cylinder Stator Unit.
- 3. Remove 2 screws (B).
- 4. Remove the Cylinder Rotor Unit.
- 5. Loose hex screw (C) and remove the Cylinder Retainer. (Use Hex. Key Wrench 1.5 mm)
- 6. Remove the Upper Cylinder.



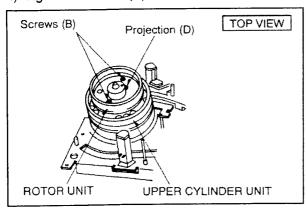
### C. UPPER CYLINDER ASSEMBLY

For reassembling, perform the steps in the reverse order.

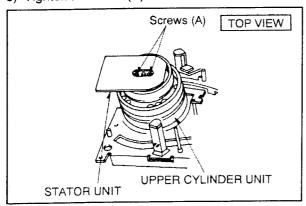
- 1) Install the Cylinder Retainer so that the 2 holes on top of the cylinder retainer are at right angles.
- Tighten the hex screw (C) while pressing downon top of the Cylinder Retainer. (Use Hex. Wrench 1.5 mm)



- 3) Install the Cylinder Rotor Unit so that the inner hole of the Cylinder rotor Unit to the small projection (D) on top of the Upper Cylinder.
- 4) Tighten 2 screws (B).



- 5) Install the Cylinder Stator Unit.
- 6) Tighten 2 screws (A).



7) Confirm the PG SHIFTER ADJUSTMENT with the alignment tape (NTSC: VFM8080HQFP) and adjust it if necessary.

## MECHANICAL ADJUSTMENT INFORMATION

This section contains the supplementary information of Mechanical Adjustment Procedure for Z-Mechanisum. Please refer to the Z-Mechanisumservice manual (Order No. VSD9706M201, VRD9802005C2)

#### 1. TEST POINT

INTERCHANGEABILITY	VIDEO RESIGNAL	TP3001 MAIN C.B.A.
ADJUSTMENT	112 12 01111011110	TP6905 REAR JACK

#### 2. SPECIFICATION

BACK TENSION	22.5 ~ 27.5g

## SECTION 5

## **ELECTRICAL ADJUSTMENT**

## **CONTENTS**

Special Adjustment Procedures for the early products	EAD-1
1.PG Shifter Adjustment	
2.Slow Free Run Adjustment	EAD-2
3 F.F. Level Adjustment	

## Special Adjustment Procedures for the early products

Following adjustment procedures is necessary for early products.

(This procedure should be necessary until the new program is introduced to the Microprocessor of the FRONT circuit. The detail information of it will be announced in the Supplement Service manual later.)

Take notes of the Menu setting items.

Power OFF the unit, and connect a jumper wire between TP6902 and TP6901on the Rear Jack C.B.A.

Perform the Slow Free Run Adjustment (Refer to procedure)

Perform the PG Shifter Adjustment.(Refer to procedure)

- During PG Shifter adjustment, disconnect the power cable from AC outlet within 1 to 4 seconds after the picture color changed to black screen from blue screen on the Monitor.
- ② Connect the oscilloscope to TP6504 (Located on VR3001 pattern of the Main C.B.A.), then confirm the pulse appears about 5 seconds after power cable is connected to AC outlet.
- ③ If pulse appear less then second (about 0.1sec), repeat the PG Shifter adjustment.

Setting of Video Freq. Response Value

- ① At STOP mode, press the Tracking (+),(-) and Counter keys simultaneously to set the Adj\_1 mode.
- ② Playback the Alignment tape, then press the F.ADV or R.ADV key to set " 0101 " as display on the LCD counter.

To next paragraph

(Continue to setting of Video Freq. Response Value)

- ③ Return to STOP mode, press the Tracking (+),(-) and Counter keys simultaneously to set the Adj\_2 mode.
- ④ Playback the Alignment tape, then press the F.ADV or R.ADV key to set following value as display on the LCD counter.

AG-RT650 : 11 AG-TL350 : 49

⑤ Return to STOP mode again, press the Tracking (+),(-) and Counter keys simultaneously to return to the Normal mode.

Initialization of Menu setting (1) Service mode

- ① Press the Power button to turn OFF the unit.
- ② Set REC\_LOCK switch to "REC\_LOCK" position.
- ③ Pressing FF and REW buttons together, press the Power button to keep holding until stop blinking of Clock display on the LCD counter.

\*Reset the Hour meter information too.

Initialization of Menu setting(2) Normal mode

- ① Press the Power button to turn OFF the unit and disconnect a jumper from the Rear Jack C.B.A..
- ② Set REC\_LOCK switch to "REC\_LOCK" position.
- ③ Pressing FF and REW buttons together, press the Power button to keep holding until stop blinking of Clock display on the LCD counter.

Re-set Main menu according to notes of first step in this procedures.

Exist

### 1. PG Shifter Adjustment

- 1. Turn OFF power.
- 2. Connect the jumper wire between TP6902 and TP6901 on the Rear Jack C.B.A..
- 3. Turn ON power.
- 4. Insert the Alignment Tape (NTSC: VFM8080HQFP, PAL: VFM8180HADH: 3rd portion)
- 5. Confirm the unit is in STOP mode, then press the TRACKING + and TIME MODE ▼ buttons simultaneously.
- 6. Place the unit into automatic adjustment mode after the unit goes to PLAY mode.
- 7. When the adjustment is completed, the unit goes to STOP mode.
- When this adjustment is terminated (keep PLAY mode), the following code appear on the FLP display.

CODE	Contents
	CYLINDER rotation is unstable during adjustment mode.
F2	No synchronized signal up to 5 sec during adjustment mode.
F3	Not specified for fried position of the CYLINDER.
	Servo not locked up to 10 sec during adjustment mode.

Note: Do not press any key during adjustment.

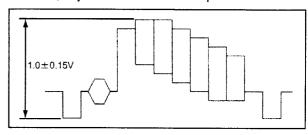
## 2. Slow Free Run Adjustment

- 1. Turn OFF power.
- 2. Connect the jumper wire between TP6902 and TP6901 on the Rear Jack C.B.A..
- 3. Turn ON power
- Insert the Alignment Tape (NTSC: VFM8080HQFP, PAL: VFM8180HADH: 3rd portion)
- 5. Confirm the unit is in STOP mode, then press the TRACKING + and TIME MODE ▲ buttons simultaneously.
- 6. Place the unit into automatic adjustment mode, after the unit goes to PLAY and STILL mode.
- 7. When the adjustment is completed, the unit goes to STOP mode.
- When this adjustment is terminated (keep PLAY mode), the following code appear on the FLP display.

CODE	Contents	
F6	Not Specified.	
F7	Force to step the adjustment during adjustment mode.	

## 3. EE Level Adjustment (AG-RT650P only)

- Connect the oscilloscope to the Video out terminal.
- 2. Confirm the video level so that  $1.0\pm0.15$ Vp-p.
- 3. If not, adjust VR3501 to be in specification.



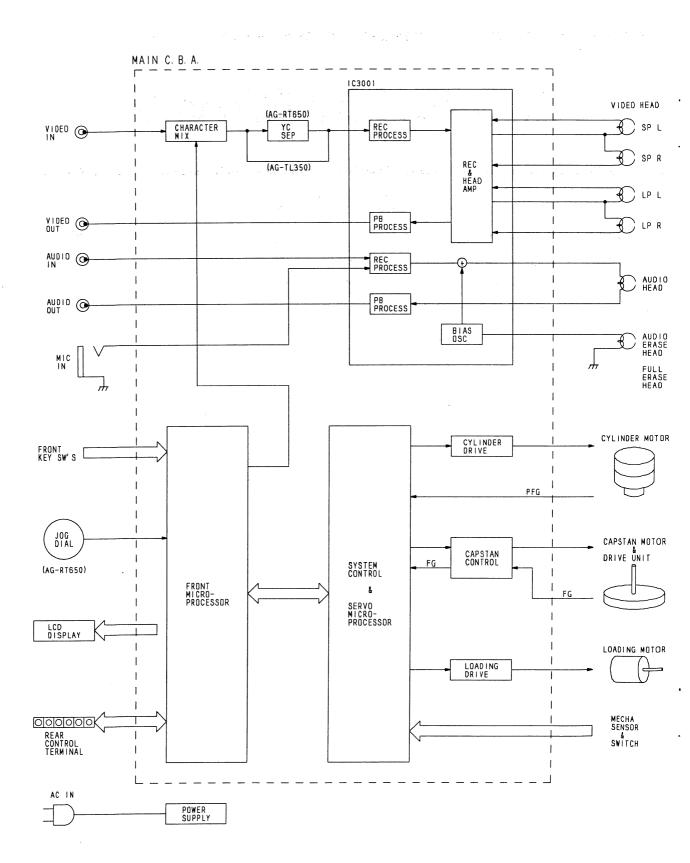
## SECTION 6

## **BLOACK DIAGRAMS**

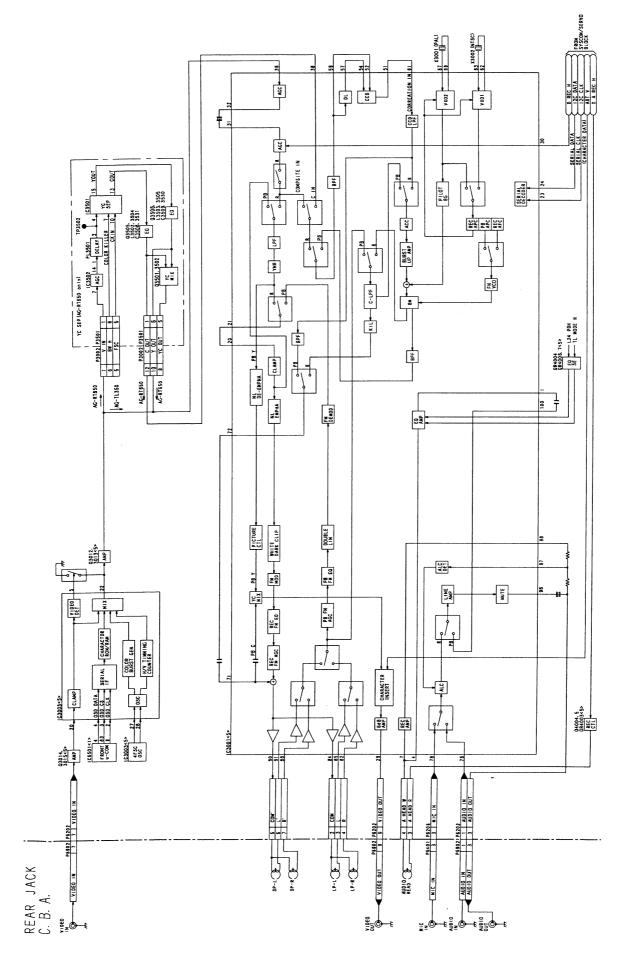
## **CONTENTS**

OVERALL BLOCK DIAGRAM	BLK-1
VIDEO/AUDIO BLOCK (MAIN C.B.A.) DIAGRAM	
SYSTEM CONTROL/SERVO BLOCK (MAIN C.B.A.) DIAGRAM	BLK-3
FRONT BLOCK (MAIN C.B.A.) DIAGRAM	BLK-4

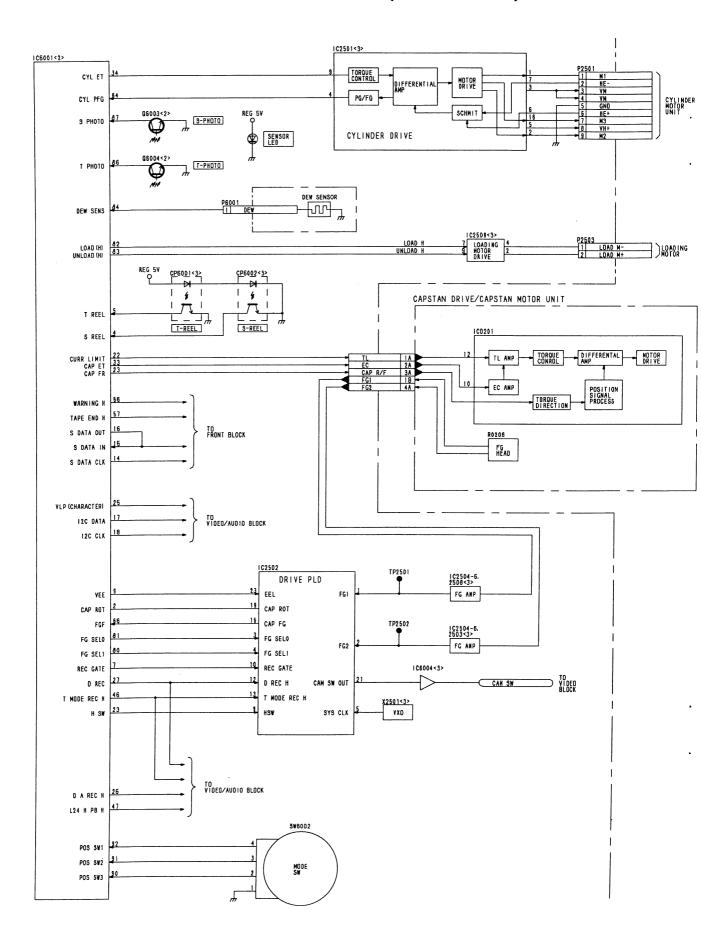
### **OVERALL BLOCK DIAGRAM**



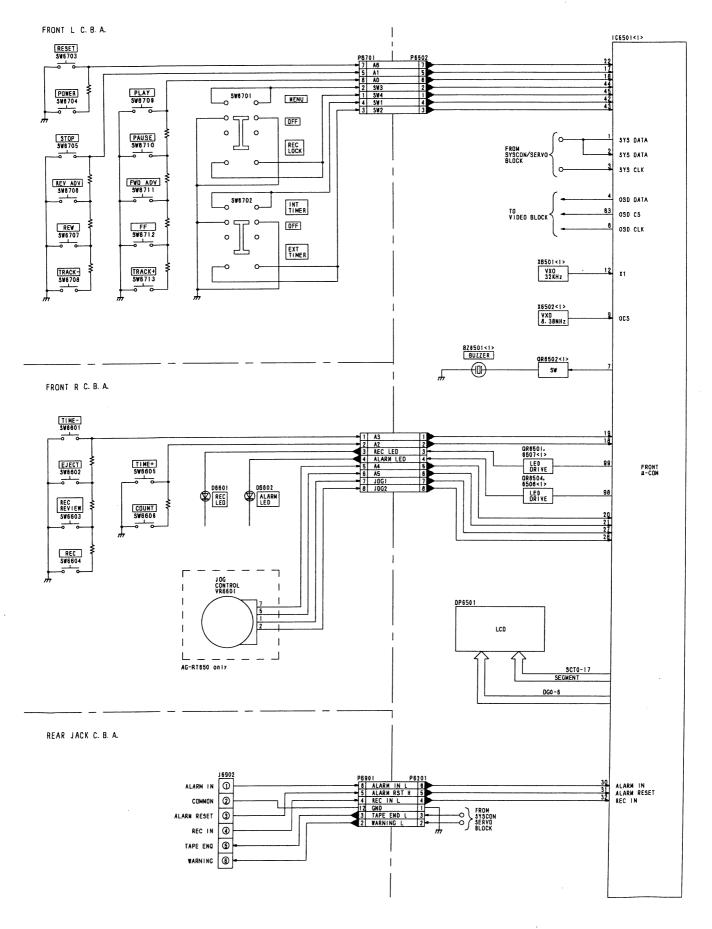
### VIDEO/AUDIO BLOCK (MAIN C.B.A.) DIAGRAM



#### SYSTEM CONTROL/SERVO BLOCK (MAIN C.B.A.) DIAGRAM

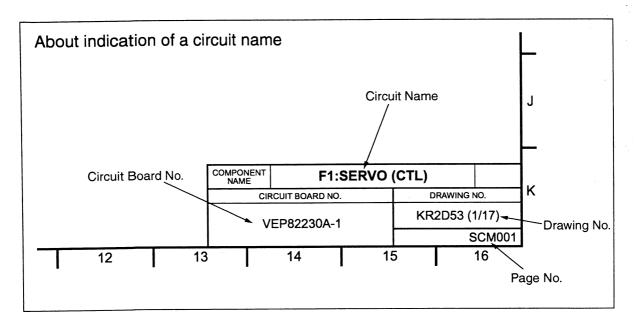


#### FRONT BLOCK (MAIN C.B.A.) DIAGRAM



## SECTION 7

## **SCHEMATIC DIAGRAMS**



#### NOTE:

BE SURE TO MAKE YOUR ORDERS OF REPLACEMENT PARTS ACCORDING TO PARTS LIST.

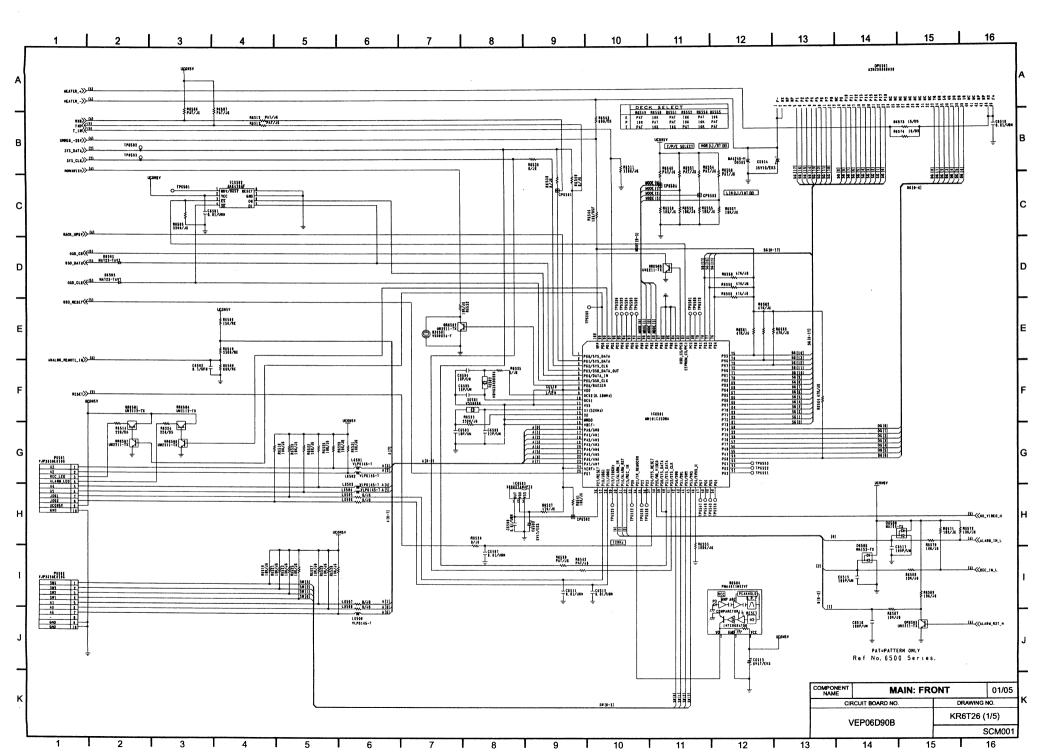
# THE MARK INDICATES THE PRIMARY CIRCUIT TO DISTINGUISH THE PRIMARY FROM THE SECONDARY CIRCUIT. PAY ATTENTION NOT TO RECEIVE AN ELECTRIC SHOCK DURING REPAIR AND SERVICE OF THE PRODUCTS.

#### IMPORTANT SAFETY NOTICE:

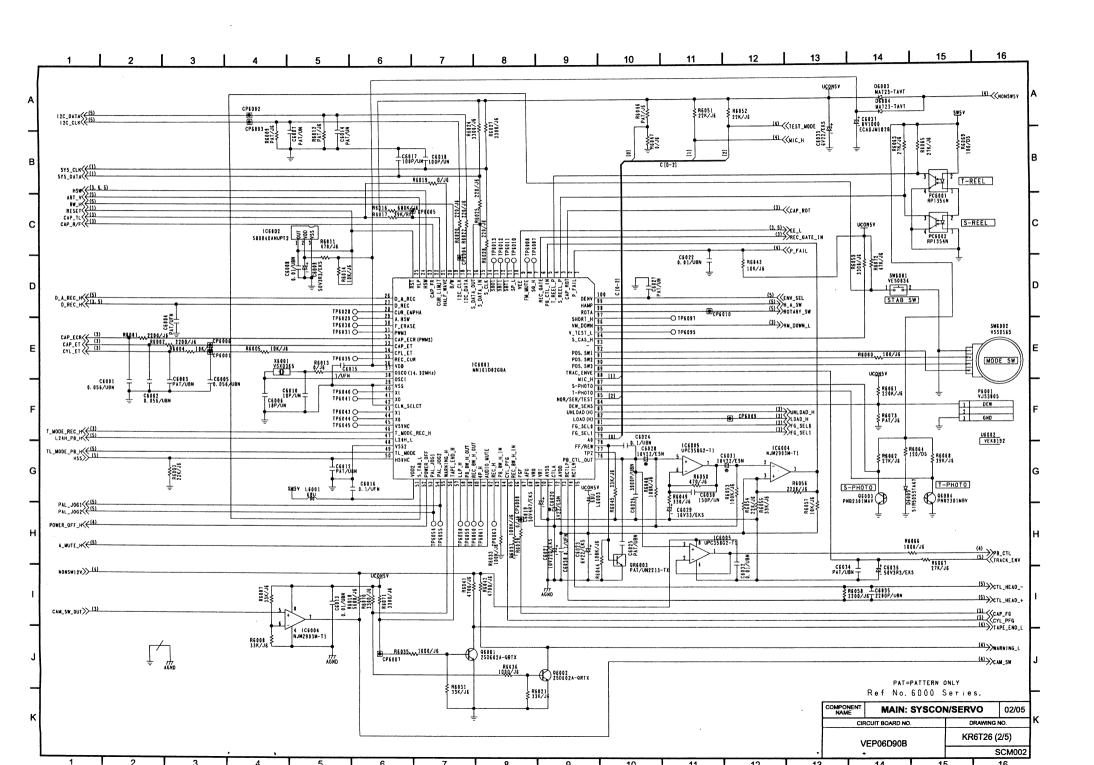
COMPONENTS IDENTIFIED WITH THE MARK A HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SAME TYPE.

# CONTENTS

MAIN  CONNECTOR (1/32)	SCM2 SCM3 SCM4		en Maria
<b>FRONT L</b> FRONT_L (1/1)	SCM6		
FRONT R FRONT_R (1/1)	SCM7		
REAR JACK REAR JACK (1/1)	SCM8		
MIC JACK MIC JACK (1/1)	SCM9		
POWER SUPPLY (1/1)	SCM10		
INTERCONNECTION (1/1)	SCM11		

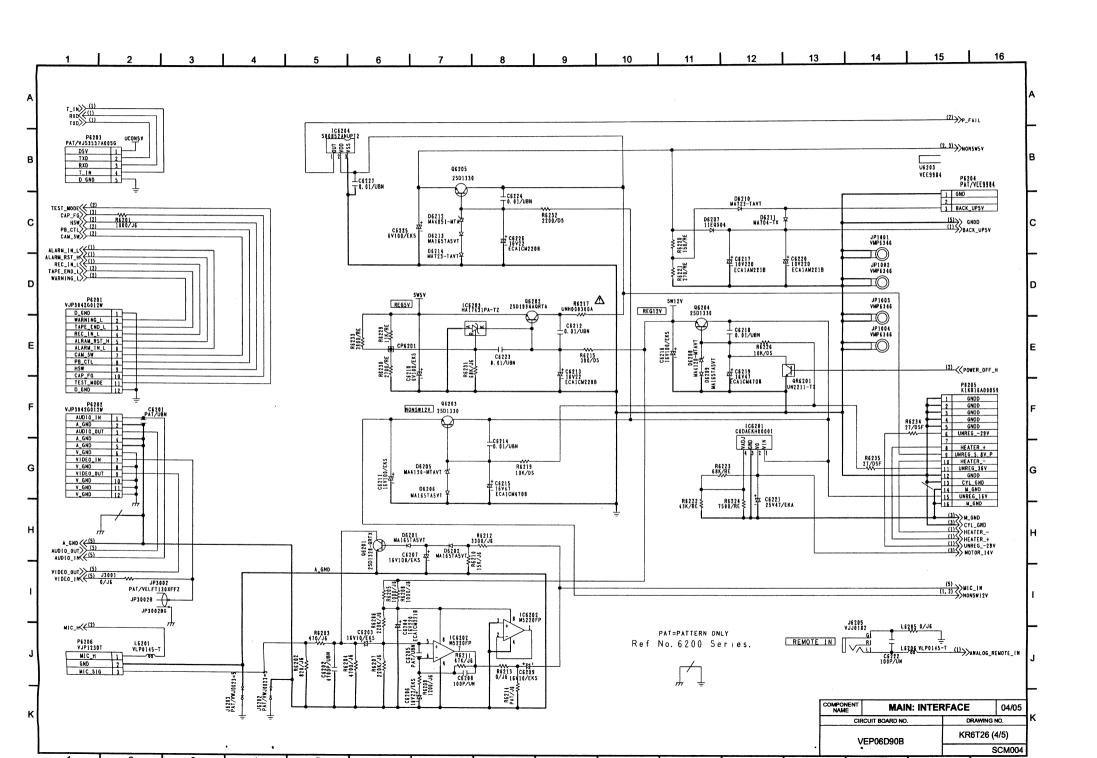


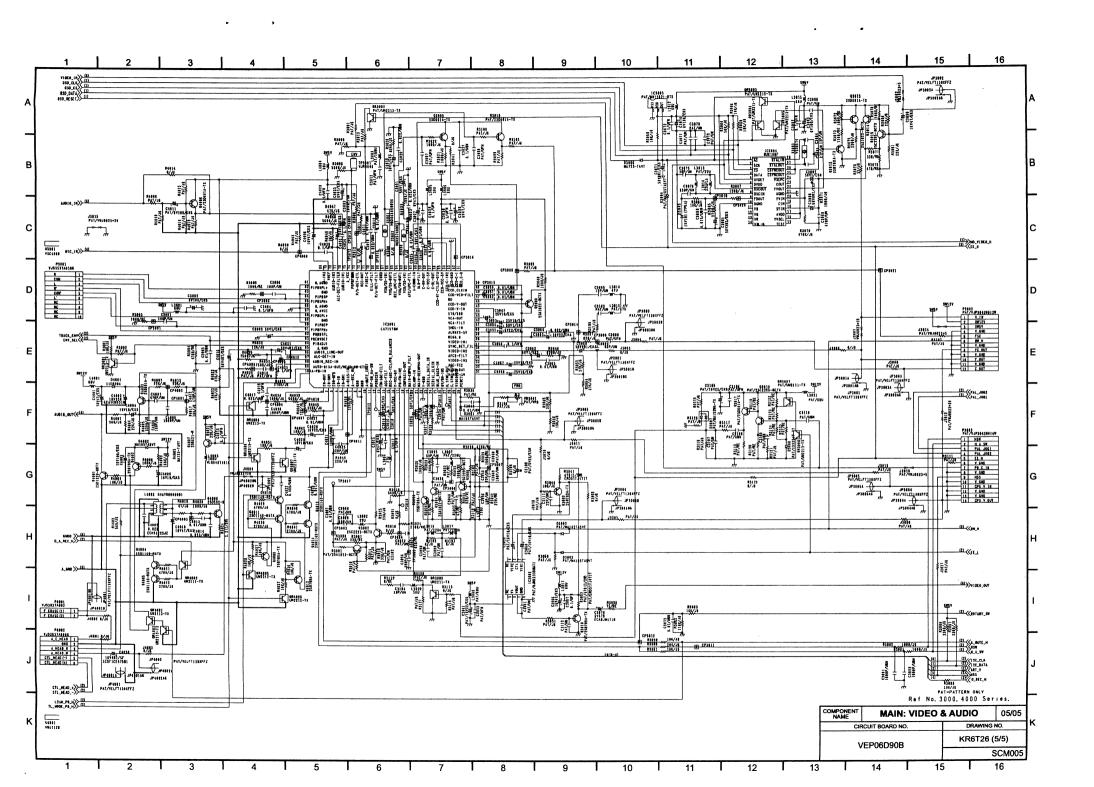
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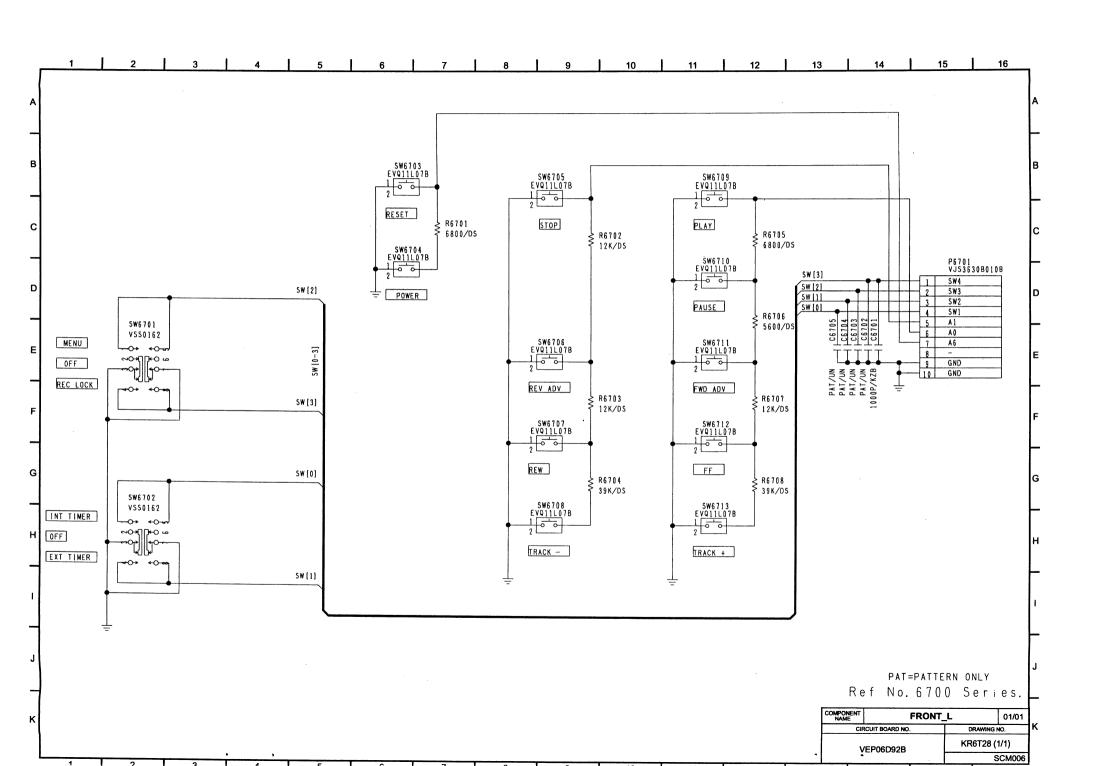


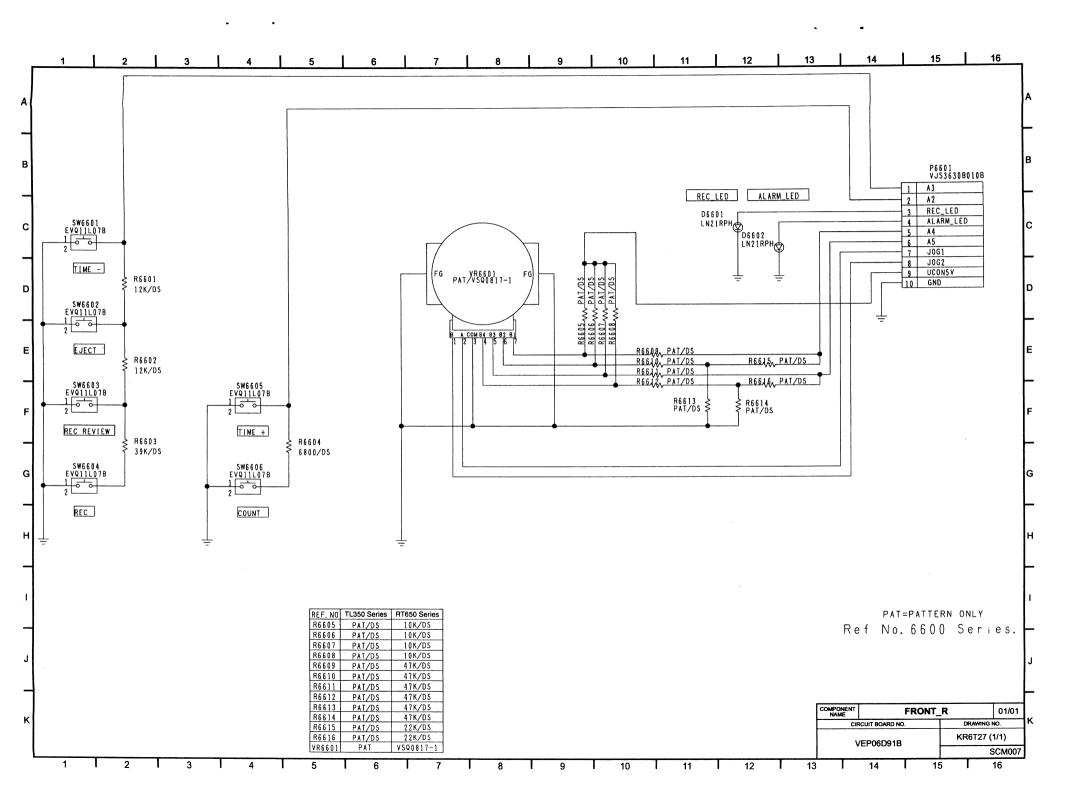
15 14 12 13 9 10 11 1 (4) (NOTOR\_14V ICESOS DAESSEAN A816328 (5)\_\_(( N\_GHO (2) UMLOAD\_H CYL\_PFE ( CTL\_ET >> (1) CYL\_GUD>>\_(4) 4220123=10 \_(1) << YN\_ DOWN\_L 18/JE R2584 (2) KCAP\_ECR 1 5 1C278094FT12L 1279499491915 1 2 97545 225-10 102587 107600 4F 120 11174 SMIIII-rx (E) (CAP\_ET (2) (CAP\_TL C1521 + 6V1888 - ECAS-M1828 FG\_SEL 0 (2) FG\_SEL 1 (2) RSV (2) REC\_GATE\_IN (2) E CP2501 TP2501 82531 56K/J6 R1536 56K/JE 1 87386 5688/Ja ¥83517... 82527 2700/JS 1C7514FTE 5L 1C2585 UPC455862-T1 02563 WA155-TX 1999U/9ET TC1314FTE85L 102504 MJM2965M-T1 UPC455862-T1 # 9881/Ess UPC455862-T1 2533/ks# PAT=PATTERN ONLY Ref No. 2500 Series. ₹1823°s ELXXIII 03/05 MAIN: MOTOR DRIVE EE\_H << (5) DRAWING NO. CIRCUIT BOARD NO. KR6T26 (3/5) VEP06D90B SCM003 16 10 11 12 14

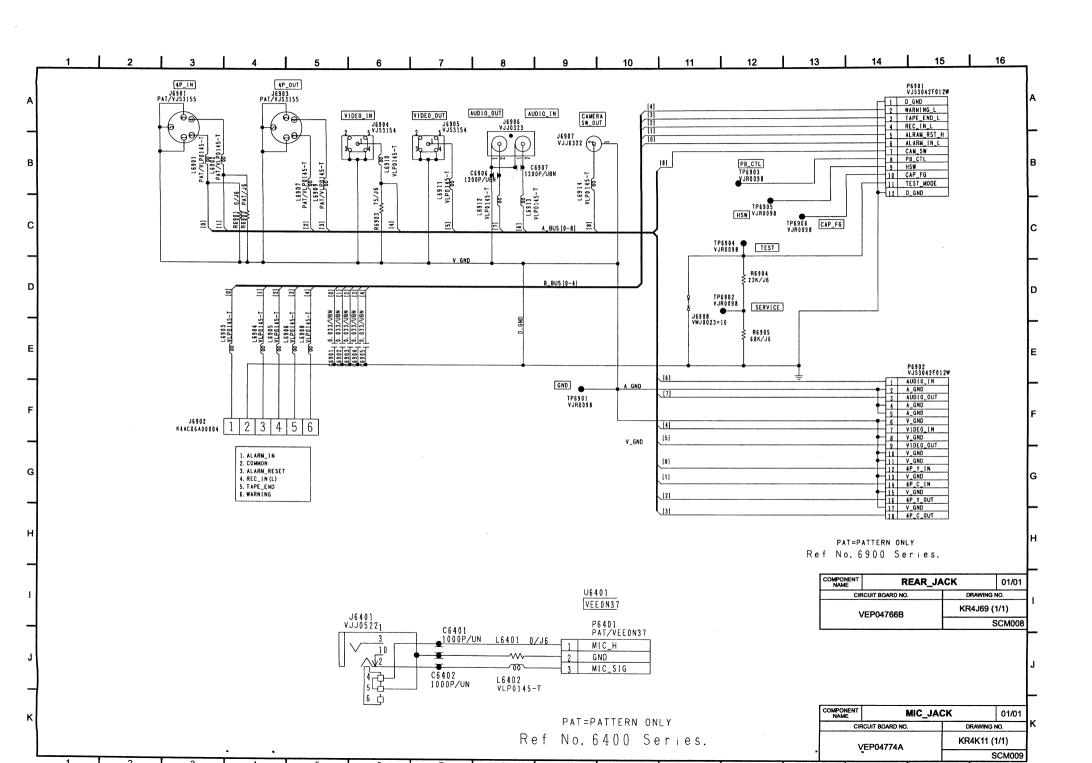
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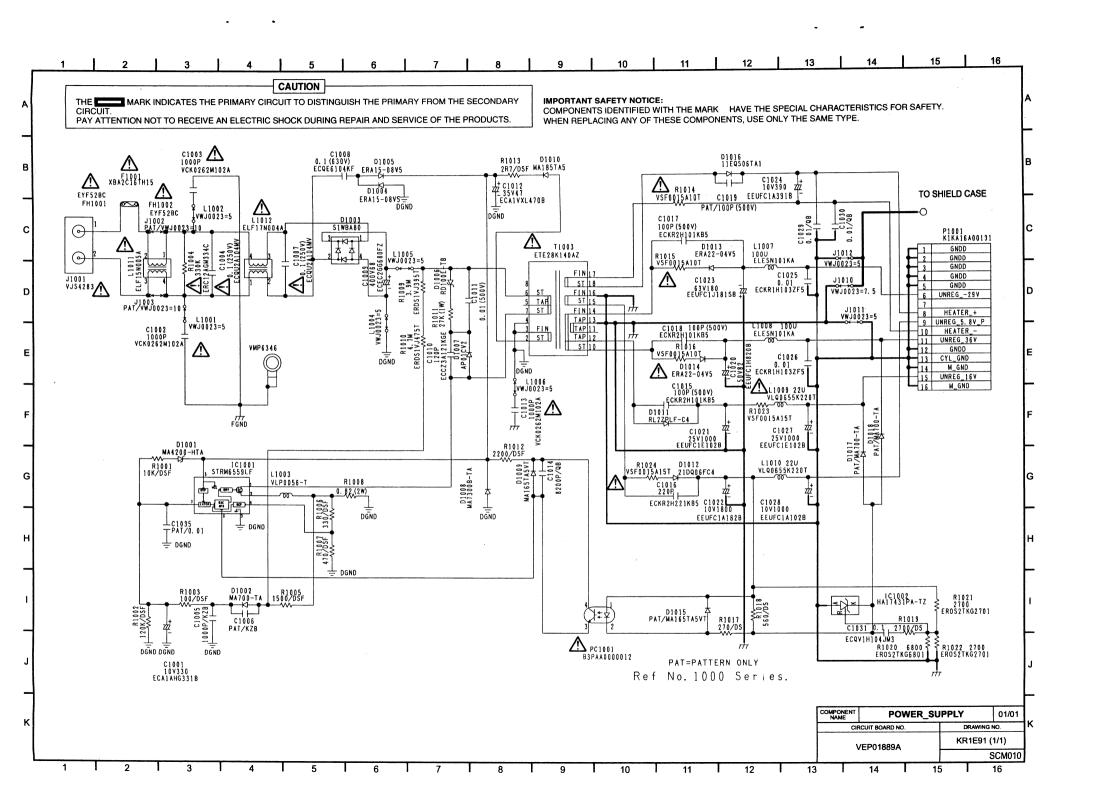


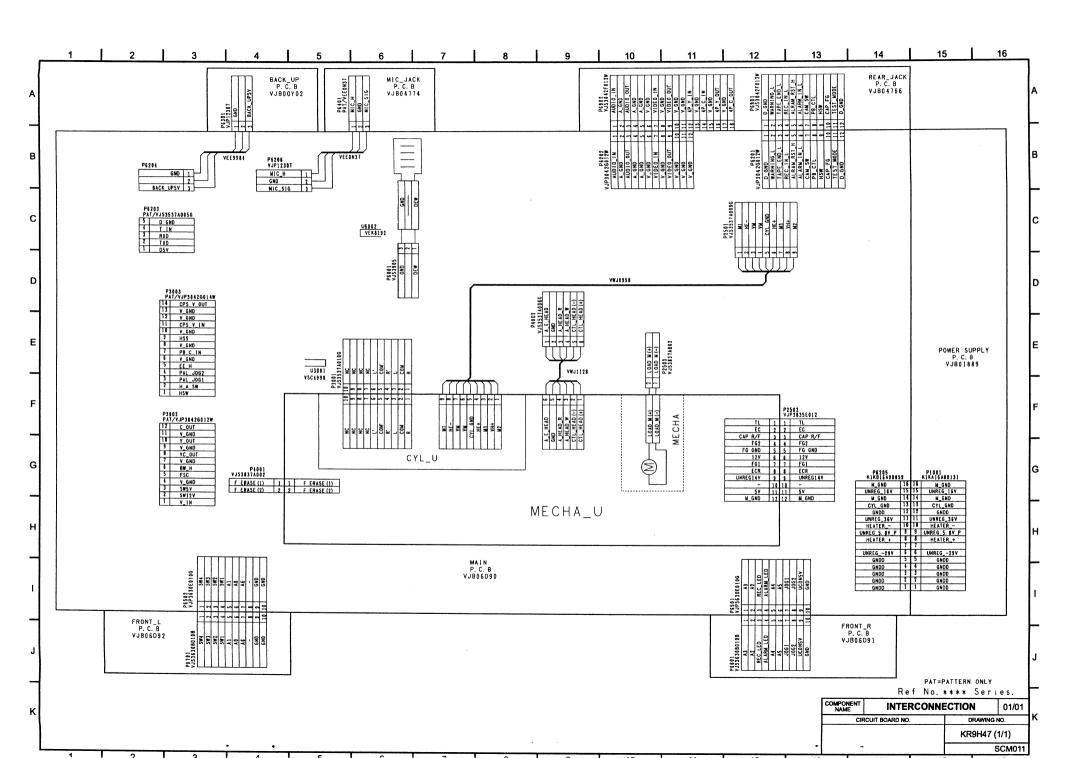












## SECTION 8

## **EXPLODED VIEWS** REPLACEMENT PARTS LISTS

#### Note:

- 1. \*Be sure to make your orders of replacement parts according to this list.
- 2. Unless otherwise specified, all resistors are in OHMS, K=1,000 OHMS, all capacitors are in MICROFARADS (μF), P=μμF.
- 3. The P.C. Board untils marked with "

  shown below the main assembled parts.
- 4. The parts marked with ©on the exploded view show the electric parts.5. IMPORTANT SAFETY NOTICE Components identified with the mark  $\Delta$  have the special characteristics for safety. When replacing any of these components, use only the same type.
- 6. The marking (RTL) indicates the retention time is limited for this item. After the diacontinuation of this assembly in production, it will no longer be available.

#### **CONTENTS**

Mechanical Replacement Parts List & Exploded Views	<b>PRT-</b> 1
Mechanical Chassis Assembly	PRT-1
Chassis Frame Assembly	PRT-3
Packing Parts Assembly	PRT-5

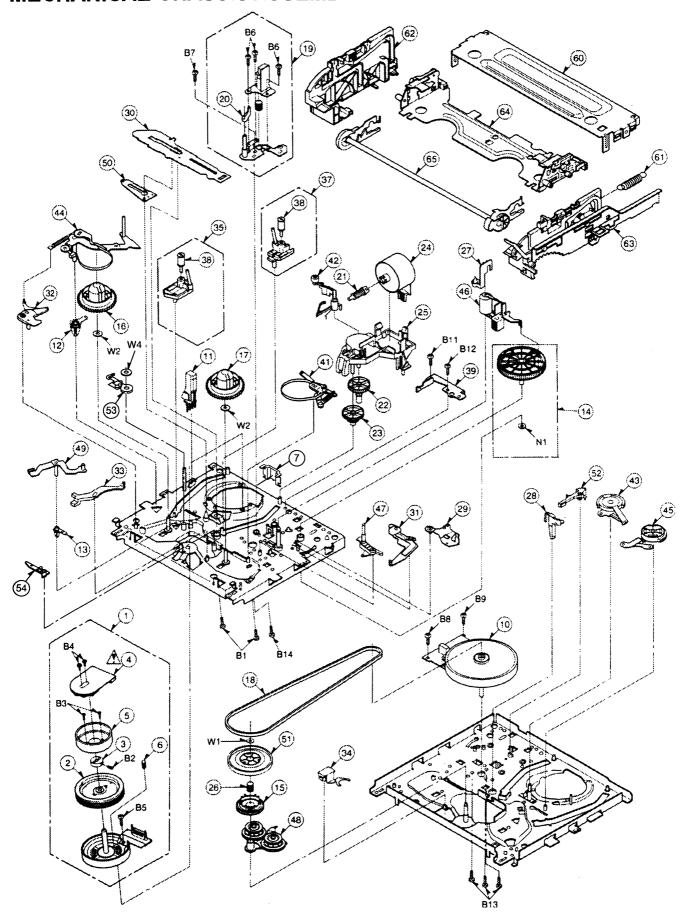
#### **SERVICING FIXTURES & TOLLS**

Ref. No.	Part No.	Part Name & Description	Pes	Remarks	Ref. No.	Part No.	Part Name & Description	Pes	Remarks
	VFJ8125H3F	ALIGNMENT TAPE (PAL)	1			VFK0335	RETAINING RING REMOVER	1	
	VFM8080HQFP	ALIGNMENT TAPE (NTSC)	1			VFK1298	FLOIL GREASE	1	
	VFK0329	POST ADJ. SCREWDRIVER	1			VFK1301	SILICONE GREASE	- 1	
	VFK0132	BACK TENSION METER	1			VFK0680	S. C. R. GREASE	1	
	VFK0330	FINE ADJ. SCREWDRIVER	1			VFK2744	16PIN EXTENSION CABLE	1	
	VFK0326	HEX. WRENCH SET	1			VFK0131	HIGH QUALITY SPINDLE OIL	1	
	VFK0948	CHECK LIGHT	1						
	MOR265	MOLYTONE GREASE	1						
	VFK27	HEAD CLEANING STICK	1						

#### **MECHANICAL CHASSIS ASSEMBLY**

Ref. No.	Part No.	Part Name & Description	Pc	Remarks	Ref	f. No.	Part No.	Part Name & Description	n Pc	Remarks
			I						I	
1 (1)	VEG1456	CYLINDER UNIT			W1 (		VMX2208	CUT WASHER	1	
2 (1)	VXP1892	UPPER CYLINDER UNIT	1		W2 (		VMX2650	WASHER	2	2
3 (1)	VDB1256	CYLINDER RETAINER			W4 (	(1)	VMX2699	WASHER	1	
<b>▲</b> 4 (1)	VEK8856	STATOR ASS' Y	1		<u> </u>				+-	
5 (1)	VXP1956	ROTOR ASS' Y  EARTH BRUSH ASS' Y	+		l				╁-	
6 (1) 7 (1)	VXS0135 VMD3795	FLAT CABLE HOLDER	+		l <del>                                    </del>				+	
10(1)	VEK9203	CAPSTAN ASS' Y			l <del> </del>		<del> </del>		+-	<del>                                     </del>
11(1)	VBS0155	FE HEAD	+		l		ļ	<del></del>	+	
12(1)	VDB1431	TENSION ARM BOSS	T		lt			:	+-	
13(1)	VDB1460	SUPPLY BRAKE ARM BOSS				*********			+	
14(1)	VDG1220K1T	MAIN CAM GEAR							1	
15(1)	VDG1221	CONVERSION GEAR								
16, 17(1)	VDR0350	TAKE UP REEL TABLE	] :	2						
18(1)	VDV0382	CAPSTAN BELT								
19(1)	VED0412	A/C HEAD ASS' Y	1		l		1			
20(1)	VMX2656	P4 CAP	1		<b>   </b>		ļ		-	
21 (1)	VDG1217	WORM GEAR	+		l I		ļ		+-	
22(1)	VDG1218 VDG1219	WORM WHEEL GEAR CENTER GEAR	+		ł		<b>}</b>		+	
23(1)	VEM0604	LOADING MOTOR ASS'Y	+-		l				+-	
25(1)	VMD2619	MOTOR BRACKET	1		11		<b> </b>	1	+-	
26(1)	VMB3045	CONVERSION GEAR SPRING	+		11		<b> </b>		+	
27(1)	VMD2620	OPENER PIECE		ı	11				T	
28(1)	VMD2738	LED PRISM	1	1					J	
29(1)	VML3165	DRIVE RACK ARM		I .					I	
30(1)	VML3166	MAIN LEVER								
31 (1)	VML3167	DRIVE MAIN LEVER ARM		1	<b> </b>		1		_	
32(1)	VML3172	SUPPLY SPRING ARM	1							
33(1)	VML3176	CONVERSION LEVER A	+		l				-	
34(1)	VML3177 VXA6040	CONVERSION LEVER B INCLINED BASE (S) ASS' Y	+-		l			<u> </u>	+	
35 (1) 37 (1)	VXA5854	INCLINED BASE (T) ASS'Y	+		l					
38(1)	VXP1840	ROLLER POST	1	2	l <del></del>				+	
39(1)	VMA9672	SUPPORT ANGLE	+						+	
41 (1)	VXL2667	TAKE UP BRAKE ARM ASS'Y	1						1	
42(1)	VXL2669	CLEANER ARM ASS'Y							T	
43(1)	VXL2670	TAKE UP LOADING ARM ASS'Y								
44 (1)	VXL2793	TENSION ARM ASS'Y	1							
45 (1)	VXL2672	SUPPLY LOADING ARM ASS'Y			<b> </b>		ļ		1_	
46(1)	VXL3037	PINCH ARM ASS'Y	1		<b> </b>				$\perp$	
47(1)	VXL2677	P5 ARM ASS' Y IDLER ARM ASS' Y	1					\$	+-	
48 (1) 49 (1)	VXL2792 VXL2737	CLAW LOWER ARM ASS' Y							+	
50(1)	VXL2747	LOADING RACK ASS' Y	+						+	
51 (1)	VXP2035	CENTER CLUTCH ASS' Y	1				l		+	
52(1)	VXZ0430	SS BRAKE ARM ASS'Y	1						T	
53(1)	VXL2783	REV ARM ASS'Y	1						$\top$	
54(1)	VML3276	IDLER POSITIONING ARM	1							
60(1)	VMA9516	TOP PLATE	1							
61 (1)	VMB3047	CONNECTION SPRING	1						Ш	
62(1)	VMD3379	SIDE PLATE (L)	1		L		ļ		$\sqcup$	
63 (1)	VXA6607	SIDE PLATE (R) ASS'Y	!		<b> </b>		ļ		+	
64 (1) 65 (1)	VXA5746 VXP1730	CASSETTE HOLDER ASS'Y MAIN SHAFT ASS'Y	╁;		l	* .			+1	
00(1)	YAF 1 /30	milit office ( Noo 1	⊢'		<b> </b>				+	· · · · · · · · · · · · · · · · · · ·
<b></b>	<del> </del>		t		<b> </b>				+	
	-		$\vdash$		1				$\dagger \dagger$	
B1 (1)	VHD1117	SCREW	2						$\dagger \dagger$	•
B2 (1)	VHD0842	SCREW	1						П	
B3 (1)	VHD0843	SCREW	2						$\Box$	
D3 (1)	VHD0844	SCREW	2							
B3 (1) B4 (1)		SCREW	1						Ш	
B4 (1) B5 (1)	XYN26+C5	<del></del>			1			ł		
B4 (1) B5 (1) B6 (1)	VHD1066	SCREW	3		<u> </u>				┰	
B4 (1) B5 (1) B6 (1) B7 (1)	VHD1066 VHD1044	SCREW SCREW	1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1)	VHD1066 VHD1044 VHD1060	SCREW SCREW	1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1)	VHD1066 · VHD1044 VHD1060 VHD1071	SCREW SCREW SCREW SCREW	3 1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F	SCREW SCREW SCREW SCREW SCREW	3 1 1 1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1) B12 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F XTN26+6F	SCREW SCREW SCREW SCREW SCREW SCREW SCREW	3 1 1 1 1 3							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1) B12 (1) B13 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F XTN26+6F XTN26+7J	SCREW SCREW SCREW SCREW SCREW SCREW SCREW SCREW SCREW	1 1 1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1) B12 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F XTN26+6F	SCREW SCREW SCREW SCREW SCREW SCREW SCREW	1 1 1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1) B12 (1) B13 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F XTN26+6F XTN26+7J	SCREW SCREW SCREW SCREW SCREW SCREW SCREW SCREW SCREW	1 1 1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1) B12 (1) B13 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F XTN26+6F XTN26+7J	SCREW SCREW SCREW SCREW SCREW SCREW SCREW SCREW SCREW	1 1 1 1							
B4 (1) B5 (1) B6 (1) B7 (1) B8 (1) B9 (1) B11 (1) B12 (1) B13 (1) B14 (1)	VHD1066 VHD1044 VHD1060 VHD1071 XTS26+6F XTN26+6F XTN26+7J VHD1095	SCREW	1 1 1 3 1 1							

#### **MECHANICAL CHASSIS ASSEMBLY**

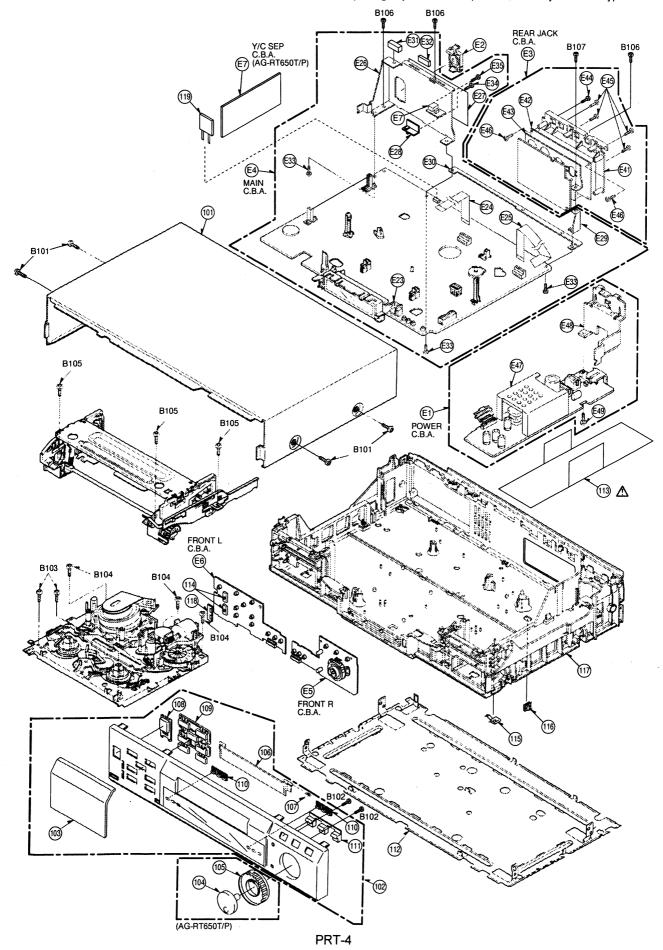


## CHASSIS FRAME ASSEMBLY Components identified with the mark △ have the special characteristics for safe when replacing any of these components, use only the same type.

				vvnen n	epiacing any	or these co	mponents, use only the	e sa	ame type.
Ref. No.	Part No.	Part Name & Description	Pcs	Remarks	Ref. No.	Part No.	Part Name & Description	Pe	s Remarks
					11	1	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1	MORE NO
101 (2)	VGM1751	TOP PANEL	1		11			+	
	VYP7975	FRONT PANEL ASS'Y	1		<u> </u>	<del> </del>		╁	
	VKF3289	FRONT DOOR	1		11	1		+	
	VXP1350-D	BLIND PANEL	1		11	<del> </del>		+	
	VMB2521	BLIND SPRING	-;		<del>   </del>	<b>_</b>		┼	<u> </u>
	VGU8710	POWER BUTTON	1		<del>   </del>	<u> </u>		+-	
108 (2)	VGU8710	OPERATION BUTTON (B)	1		{ <del> </del>	·		+	
109 (2)	VGU8709 VGU8198	CH BUTTON	2		<del>                                     </del>	ļ		╀	ļ
		ODERATION DUTTON (A)	1		-	ļ		↓_	
	VGU8708	OPERATION BUTTON (A)			ł <b>–</b> ——	<b>_</b>		1_	
112(2)	VKU0551	BOTTOM PLATE	1		<b>                                     </b>	ļ		1	
	VMZ3124	BARRIER	1		<b> </b>			┺	
	VGU8761	SW KNOB	2		1			_	
	VMC1065	EARTH SPRING (FRONT)	1		<u> </u>				
	VMC1709	EARTH SPRING (REAR)	1		<b> </b>			1_	
	VMD4134	FRAME	- 1		<b> </b>			L	
	VMZ3157	BARRIER	1						
119 (2)	EYHS10Y2	DEW SENSOR	1		<b>                                     </b>				
					1				
					11	L			
								L	
	XTW3+10TFC	SCREW	4						
B102(2)	XTN2+8G	SCREW	2		1			L	***
	VHD0163	SCREW	2					$\Gamma$	
	VHD1065	SCREW	3						
	XTV26+8FR	SCREW	3						
	XTV3+10GR	SCREW	3					Γ	
B107(2)	XSN3+8FXS	SCREW	1						
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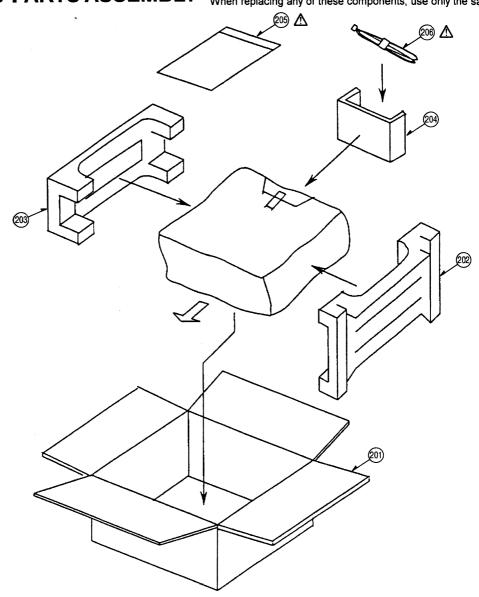
#### CHASSIS FRAME ASSEMBLY

Components identified with the mark  $\triangle$  have the special characteristics for safety. When replacing any of these components, use only the same type.



PACKING PARTS ASSEMBLY

Components identified with the mark  $\triangle$  have the special characteristics for safe When replacing any of these components, use only the same type.



PACKING PARTS ASSEMBLY

Components identified with the mark have the special characteristics for safet When replacing any of these components, use only the same type.

Re	f. No.	Part No.	Part Name & Description	Pes	Remarks	Ref. No.	Part No.	Part Name & Description	Pes	Remarks
										+
201	(3)	VPG0G69	PACKING CASE	1	FOR AG-TL350E					
201	(3)	VPG0G70	PACKING CASE	1	FOR AG-TL350B					
202	(3)	VPN5475	CUSHION (L)	1						
203	(3)	VPN5476	CUSHION (R)	1						1
204	(3)	VPN4479	PAD	1	FOR AG-TL350E					
204	(3)	VPN4480	PAD	1	FOR AG-TL350B					
⚠ 205	(3)	VQT8959	OPERATING INSTRUCTIONS	1	FOR AG-TL350E					
⚠ 205	(3)	VQT8975	OPERATING INSTRUCTIONS	1	FOR AG-TL350B					
⚠ 206	(3)	VJA0664	POWER CODE	1	K2CR2DA00004 FOR AG-TL350E					
⚠ 206	(3)	VJA0733	POWER CODE	1	K2CT3DA00001 FOR AG-TL350B					
			·							

# Service Manual



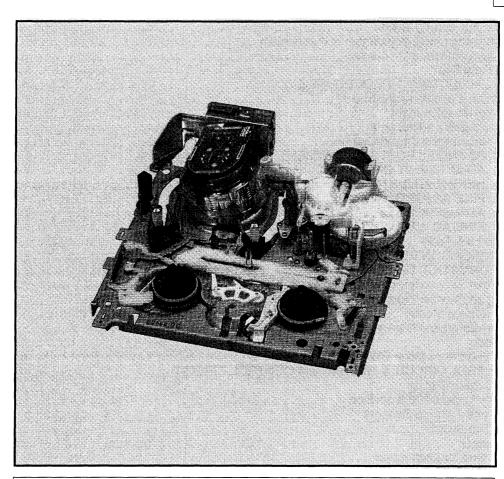
Video Cassette Recorder

Panasonic VHS



## **Z-MECHANISM CHASSIS**

**REV-1** 



#### INTRODUCTION

The Z-Mechanism chassis are built in several Panasonic VHS Video Cassette Recorders from NV-SD and NV-HD series in 1998.

#### ⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.

Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

## Panasonic

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#### 1. OUTLINE OF Z MECHANISM

#### 1-1. The tape transport path

(1) Mechanism Chassis

Aluminium Chassis has been changed to sheet metal (Thickness: 1.2 mm).

(2) Capstan position (Cassette-in method/Capstan-in method)

The Tape does not touch the Cassette tape so that the rationalization has been promoted such as Reel gear pinch up/down mechanism has been deleted.

(3) Deletion of P1 post

FE Head has been installed Limiter so that P1 post has been deleted.

(4) A/C Head base combined with P4 post

A/C Head has been combined with P4 post on the same base.

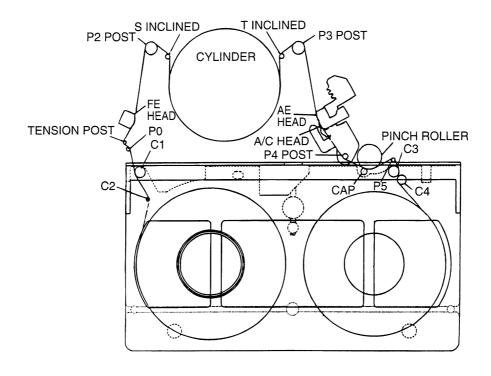
(5) Change of A/C head base type

The change of the angle winding the tape on A/C head has been reduced by the construction of A/C head base has been changed from the revolution type to slide base type.

(6) Improvement of P5 post

P5 post operation has been changed by non-adjustable of the Height and the Tilt adjustment so that the specification has been improved.

#### Z Mechanism tape transport path in REV mode



#### 1-2. Cassette holder unit

(1) Cassette-in operation

The Rack drive arm drives Main Cam gear by inserting the cassette tape. Consequently, Position switch detects the cassette-in mode so that Loading motor drives. The mode goes to the Stop mode from the Cassette-in through the Loading mode.

- 1) The parts quantity reduction of Cassette holder unit.
  - (Z Mechanism: 21 pieces, K Mechanism: 36 pieces)
  - a. Release lever has been installed in Right Side Plate.
  - b. Cassette guide has been installed in Front Panel unit.
  - c. Safety lever spring is made by the resin.
  - d. Opener lever has been changed into the single opener type.
  - e. One side of Side Plate unit is hung on Chassis in order to fix it.
- ② Improvement of the cassette insertion

(The force of the cassette insertion Z Mechanism: Approximately 400gm.,

K Mechanism: Approximately 600gm.)

The tooth pitch of Worm gear which has been extended against the previous model, is located on the Motor so that Worm gear can be reversed. Consequently, the Motor rotates before the insertion spring (the combined spring) is working when the cassette tape is inserted, so that the repelled force of the insertion spring has been reduced as differing from the present model.

- 3 Small-sized Cassette holder unit (Thinned unit)
  - a. The Wiper arm method which has been adopted, assigned Wiper arm between Cassette Holder Plate and Side Plate so that the small-sized of the width has been realized.
  - b. To prevent the increment of parts quantity such as Safety lever is used for Pre-open mechanism shown in the present model, and the small-sized unit has been realized by inclining one portion of the L groove in Side Plate.
  - c. The part of driving change-over is located in the nearest to the center of Reel so that the depth size is compacter.

#### 1-3. Reel brake

- (1) Supply Reel Brake is used for Tension Regulator which is composed of the conventional Main brake and the soft brake function.
- (2) Take-up Reel Brake is used as Band Brake unit in order to correspond with Supply Reel Brake.
- \* Tension Regulator performance:
  - This is composed of Tension regulator and brake. The tape always is given the tension against the advance direction by Tension band.
- (3) Construction of Supply reel tension regulator

  Comparison of the construction with the conventional model

	Z Mechanism	K Mechanism
Tension Arm Shaft	Resin	Tension arm
Bearing construction		
Tension Band	Felt less Lumiller	Felt Lumiller
Braking method	Tension regulator	Main & soft brake

Operating mode and necessary function

Mechanism mode	Necessary function	Operation
Cassette down	Prevention of the tape slag	Soft brake
	(Soft brake)	
Completion of Loading	Prevention of the tape slag	Tension regulator
	(Soft brake)	
REV	Prevention of in Play mode	Tension regulator
	to REV mode (Soft brake)	
PLAY, FF	Back tension adjustment	Same as the conventional
STOP	Main brake function	Tension regulator

#### (4) Construction of Take-up brake

Take-up brake is used Band brake as well as Supply brake depend on corresponding with Band brake is adopted at the Supply Side.

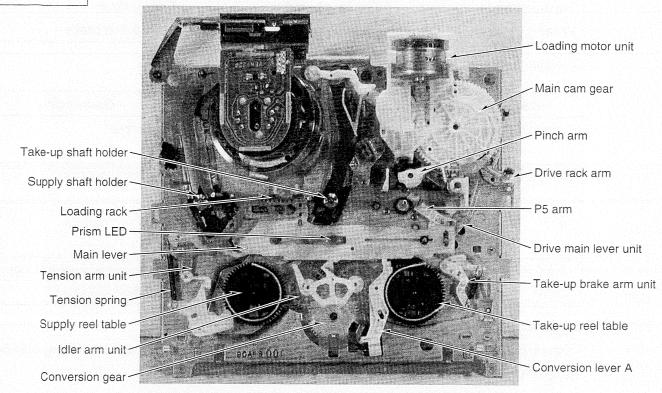
Mechanism mode	Function	Band
EJECT-MID	Soft brake	On
REV	Soft brake	On
PLAY	Release of brake	Off
STOP	Brake	On
FF/REW	Release of brake	Off

#### 1-4. Number of Gear Phase Alignment Point and Replacement Parts

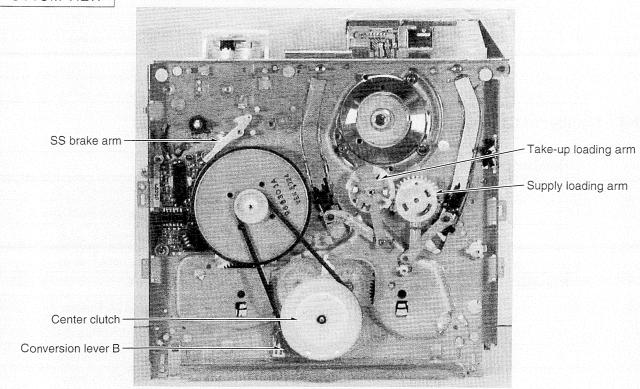
Number of Gear Phase Alignment Point				
G2 Mechanism	12 Alignment Points			
G Mechanism	12 Alignment Points			
K Mechanism	6 Alignment Points			
Z Mechanism	4 Alignment Points			
Number of Replacement Parts (including the	Screw and Washer)			
G2 Mechanism	Approx.170 Pieces			
G Mechanism	Approx. 150 Pieces			
K Mechanism	Approx. 100 Pieces			
Z Mechanism	Approx. 70 Pieces			

#### **Z Mechanism Components**

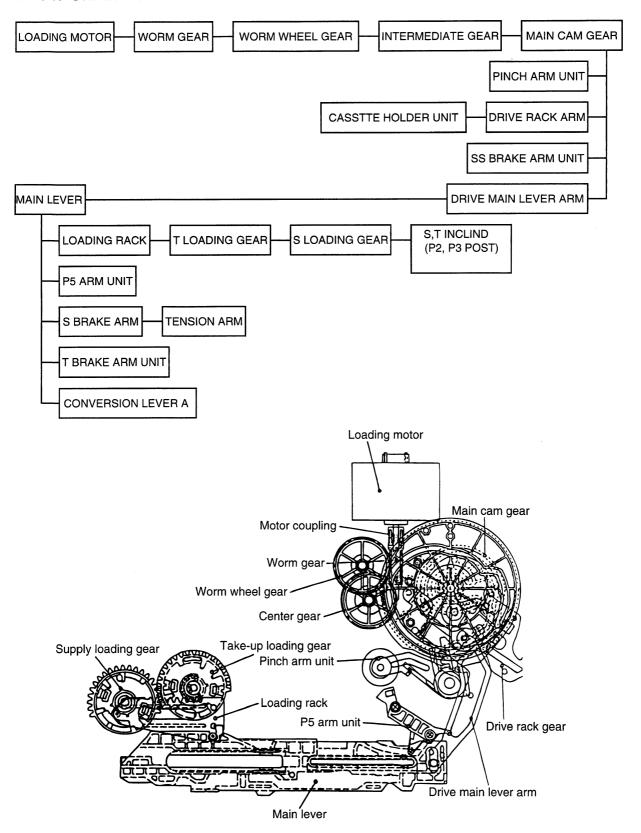
TOP VIEW



#### **BOTTOM VIEW**



#### FLOW CHART OF LOADING MECHANISM



#### 2. REMOVAL OF CASSETTE TAPE

There are 2 ways to remove a cassette tape.

#### 2-1. Removal of compulsory loading

(1) Press FF and EJECT buttons simultaneously for more than 3 seconds and set the Service Mode 7.

In case of VCR mounted shuttle ring, turn the shuttle ring to FF and then press EJECT button for more than 3 seconds.

In Loewe model, STOP button is used instead of FF button.

(2) Press STOP button in order to unload the mechanism. (Pay an attention of tape slack) Service Mode Indication:

7 \*\* \*\* (STOP)→7 00 \*\* (EJECT)

## 2-2. Removal of manual operation of Main cam gear

- (1) Disconnect the AC power cord and remove Top Panel.
- (2) Rotate Main cam gear to the clockwise and unload the mechanism (Tape is remaining) (Fig. A1).

#### **TOP VIEW**



Fig. A1

(3) Rotate the Pole of Capstan motor to the clockwise from the bottom in order to remove the tape slack (Fig. A2).

#### **BOTTOM VIEW**

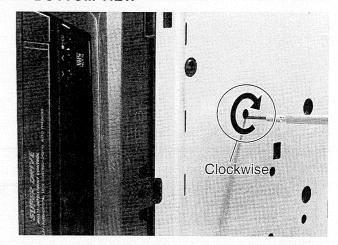


Fig. A2

(4) Rotate Main cam gear to the clockwise in order to eject the cassette tape.

## 3. REMOVAL OF CASSETTE HOLDER UNIT & MECHANISM CHASSIS

#### 3-1. Removal of Cassette holder unit

(1) Remove Top panel and Front panel unit (Fig. B1).

#### **TOP VIEW**

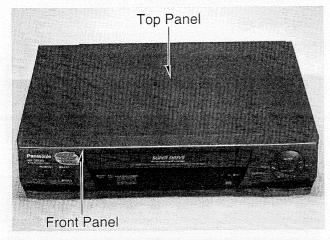


Fig. B1

- (2) Remove Top plate
  Remove 4 tabs fixing Top plate and remove Top
  plate (Fig. B2).
- 4 Tabs should be removed softly due to they are fragile.

#### **TOP VIEW**

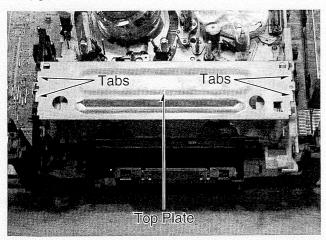


Fig. B2

(3) Remove Cassette Holder Keep pressing 2 stoppers on Cassette holder and Press Cassette holder to the rear and re-

move it from Left and Right Side Plate (Fig. B3).

#### **TOP VIEW**

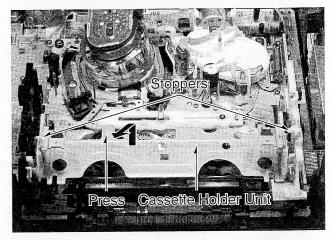


Fig. B3

(4) Remove Left and Right Side Plate Remove connection spring of Drive gear. Remove 3 red screws, 3 tabs and remove Left and Right Side Plate (Fig. B4, B5).

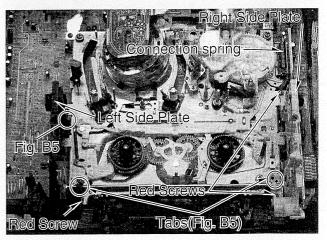


Fig. B4

#### **TOP VIEW**

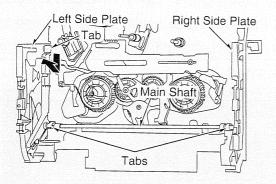


Fig. B5

(5) Remove Main shaft (Fig. B6)

#### **TOP VIEW**

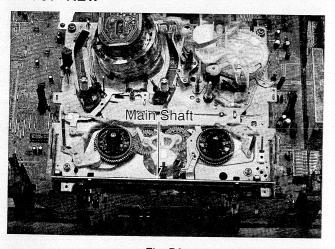


Fig. B6

#### 3-2. Removal of Mechanism chassis

(1) Remove Mechanism chassis

Disconnect P3001, P2502 and P4002 (the connectors of Head amp C.B.A., Cylinder unit and A/C Head). Remove 5 screws (3 red screws and 2 gold screws) on Mechanism chassis and take out Mechanism chassis (Fig. B7).

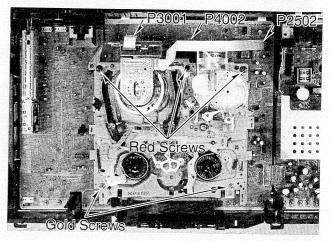


Fig. B7

## 4. DISASSEMBLY/ASSEMBLY METHOD FOR MECHANISM

#### 4-1. Disassembly of mechanism

- Removal of Pinch arm
   Unlock the tab (opener piece). Remove Opener
   piece and Pinch arm (Fig. C1).
- 2. Removal of Loading motor unitUnlock 3 tabs and remove Loading motor unit(Fig. C1, C2).2 tabs of them located on the bottom of the

2 tabs of them located on the bottom of the Mechanism (Fig. C2).

#### **TOP VIEW**

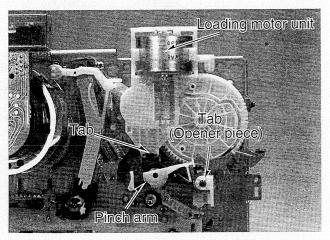


Fig. C1

#### **BOTTOM VIEW**

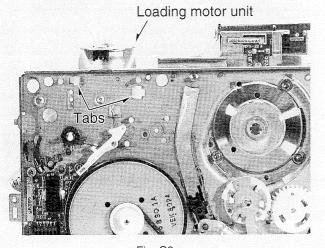


Fig. C2

#### 3. Removal of Main cam gear

Remove Snap washer located on the bottom of Chassis by using retaining ring remover (Fig. C3) and remove Main cam gear (Fig. C4).

#### **BOTTOM VIEW**

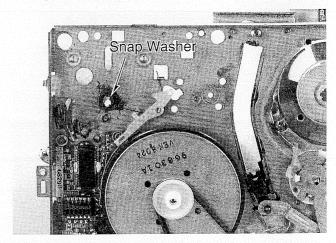


Fig. C3

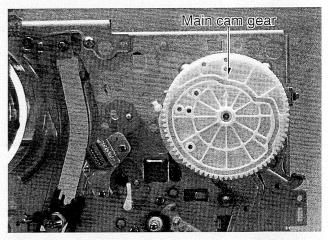


Fig. C4

 Removal of Drive rack arm
 Rotate Drive rack arm to the counterclockwise and remove it (Fig. C5).

#### **TOP VIEW**

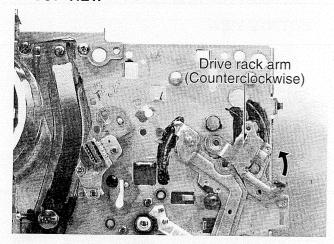


Fig. C5

- Removal of Main lever, P5 arm and Conversion lever A
  - Unlock 2 tabs of Prism LED and 1 tab on the projection of Chassis while keep lifting the left side of Main lever, and remove Main lever, P5 arm and Conversion lever A (Fig. C6).
- It is easier to unlock the tabs by using a tweezer.

#### **TOP VIEW**

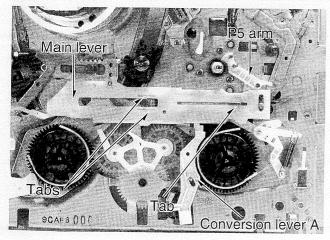
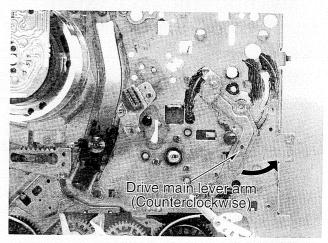


Fig. C6

6. Removal of Drive main lever arm
Rotate Drive main lever arm to the counterclockwise and remove it (Fig. C7).

#### **TOP VIEW**



7. Removal of Tension arm unit and Supply reel table

Remove Tension spring (Fig. C8). Unlock the tab of Tension arm projection on the bottom of Chassis (Fig. C9) and remove Tension arm unit and Supply reel table (Fig. C8).

When remove supply reel table, be sure whether a washer attaches on Supply reel table shaft (Fig. C10).

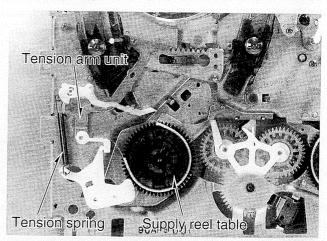


Fig. C8

#### **BOTTOM VIEW**

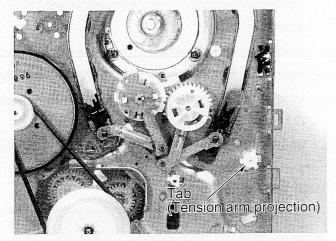


Fig. C9

#### SIDE VIEW

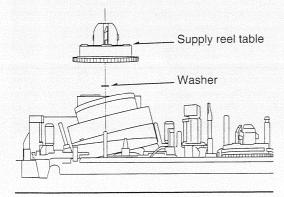


Fig. C10

- 8. Remove of Take-up brake arm unit and Take-up reel table
  - Unlock the tab of Take-up brake arm unit from the bottom of Chassis (Fig. C12). Remove Takeup brake arm unit and Take-up reel table (Fig. C11).
- When remove Take-up reel table, be sure whether a washer attaches on Take-up reel table shaft (Fig. C13).

#### **TOP VIEW**

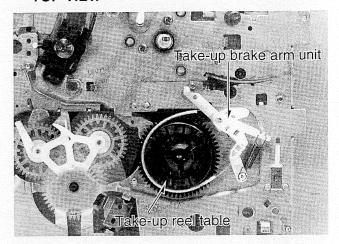


Fig. C11

#### **BOTTOM VIEW**

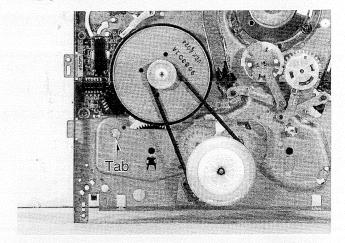


Fig. C12

#### SIDE VIEW

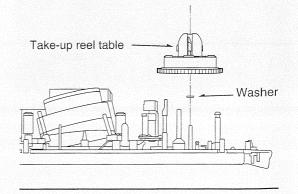


Fig. C13

Removal of Take-up & Supply loading arm
 Unlock the tab and remove Take-up and Supply
 loading arm (Fig. C14).

#### **BOTTOM VIEW**

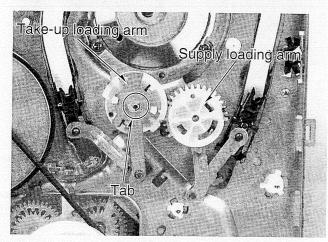


Fig. C14

 Removal of Prism LED, Take-up & Supply shaft holder and Loading rack

Push the tab of Prism LED and remove Prism LED. Remove Take-up and Supply shaft holder from the groove of Chassis and remove Loading rack (Fig. C15).

#### **TOP VIEW**

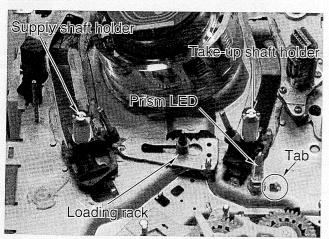


Fig. C15

- 11. Removal of Center clutch, Conversion gear spring, Conversion gear, Conversion lever B and Idler arm unit
  - Remove the Belt and the Cut washer (Fig. C16). Remove Center clutch (Fig. C16), Conversion gear spring, Conversion gear, Conversion lever B and Idler arm unit (Fig. C17).
- Pay an attention of Conversion gear spring during the removal.

#### **BOTTOM VIEW**

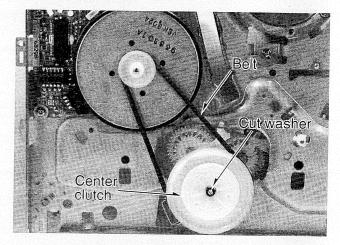


Fig. C16

#### **BOTTOM VIEW**

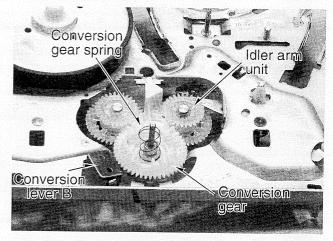


Fig. C17

#### 12. Removal of Capstan unit

Remove 3 gold screws (Fig. C18).

Remove 2 gold screws on the bottom of Chassis (Fig. C19).

Keep moving SS brake arm and remove Capstan unit.

#### **TOP VIEW**

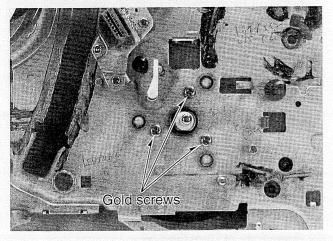


Fig. C18

#### **BOTTOM VIEW**

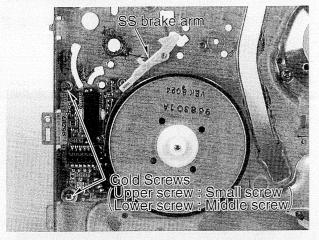


Fig. C19

#### 13. Removal of Cylinder unit

Remove red screw (Fig. C20).

Remove 3 gold screws on the bottom of Chassis and remove Cylinder unit (Fig. C21).

#### **TOP VIEW**

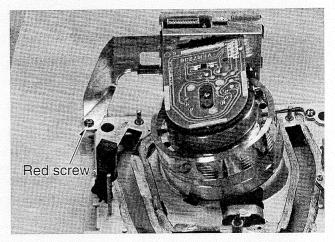


Fig. C20

#### **BOTTOM VIEW**

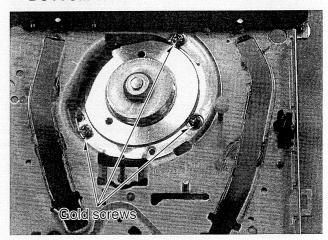


Fig. C21

# 4-2. Assembly and phase adjustment of mechanism

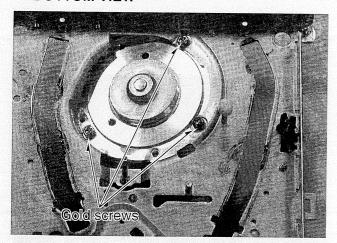
The gear phase alignment has been performed in the EJECT position and it is crucial for the Z Mechanism to operate correctly.

NOTE: In case of the parts replacement like Position switch, Mechanism position should be set to Eject position in order to fit the phase of Position switch.

- 1. Assembly and phase adjustment of Mechanism
- (1) Assembly of Cylinder unit

Cylinder unit should be fixed by 3 screws (GOLD) from the bottom side of Mechanism chassis and red screw on the top side of Mechanism Chassis (Fig. E1, E2).

#### **BOTTOM VIEW**



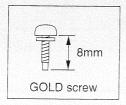
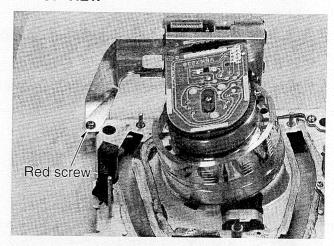


Fig. E1

#### **TOP VIEW**



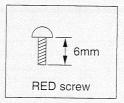
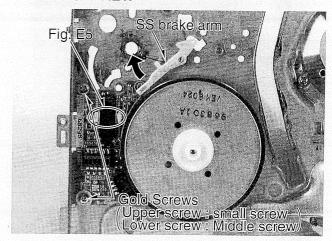


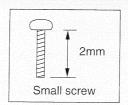
Fig. E2

## (2) Assembly of Capstan unit

Move SS brake arm in the direction of arrow (see Fig. E3) and capstan unit should be fixed by 2 screws (GOLD) on the bottom side of Mechanism chassis and 3 screws (GOLD) on the top of Mechanism chassis (Fig. E3, E4).

#### **BOTTOM VIEW**





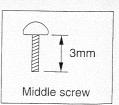
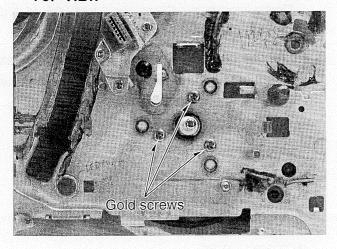


Fig. E3

#### **TOP VIEW**



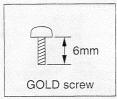


Fig. E4

NOTE: Replacement of Capstan unit and Procedure of applying the silicone grease.

#### REPLACEMENT OF CAPSTAN UNIT

In case of replacement of the Capstan Unit the Silicone grease have to be applied between the Mechanism chassis and the Drive IC by the following procedure.

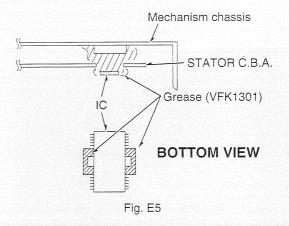
Silicone grease No. VFK1301 for radiation of the Drive IC

Silicone grease is used for the radiation of the Drive IC. The heat occurred on the IC is radiated to the Mechanism chassis through the grease. In case of the incomplete radiation, the safety circuit operates depending on the rise of the temperature and it possibility stop the operation of the Drive IC.

# PROCEDURE OF APPLYING THE SILICONE GREASE

- ① There is a cut-out part at the Drive IC mounting position and the bottom of the IC can be seen from the cut-out part. Apply the Silicon grease to whole the cut-out part of IC as shown in Fig. E5-1 so that the grease is piled 0.3–0.5 mm from the surface of the C.B.A.
- ② Next, from the component side of the C.B.A., apply the Silicon grease so that the grease is piled at the metal of the center of the IC as shown in Fig. E5-2.

#### SIDE VIEW



#### **TOP VIEW**

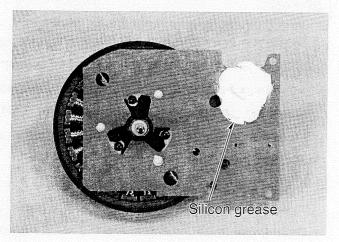


Fig. E5-1

Fig. E5-1. Apply the Silicon grease so that the grease is piled 0.3–0.5 mm from the surface of the C.B.A.

#### **BOTTOM VIEW**

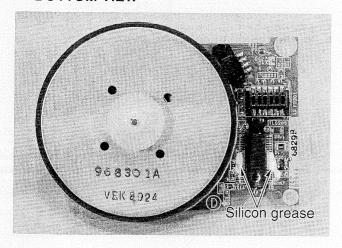


Fig. E5-2

Fig. E5-2. Apply the Silicon grease at the metal of the center of the IC.

- (3) Assembly of Idler arm unit, Conversion lever B, Conversion gear, Conversion gear spring and Center clutch
  - Put above parts together in the following order and fix them by Cut washer (Fig. E6), and install Capstan belt.
  - 1 Idler arm unit
  - 2 Conversion lever B
  - 3 Conversion gear
  - ④ Conversion gear spring
  - ⑤ Center clutch

### **BOTTOM VIEW**

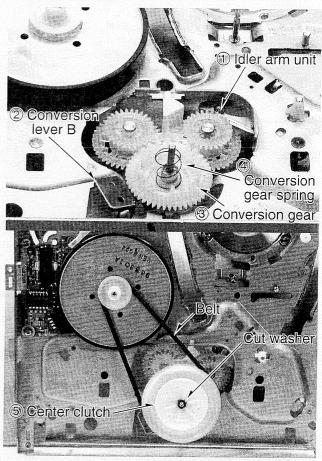


Fig. E6

(4) Assembly of Loading rack, Take-up & Supply shaft holder and Prism LED

Adjust the phase between the hole of Loading rack position fixture and the penetration hole of Chassis. Install Take-up and Supply shaft holder so that Take-up and Supply shaft holder fits the groove of Chassis.

Put Prism LED together (Fig. E7).

#### **TOP VIEW**

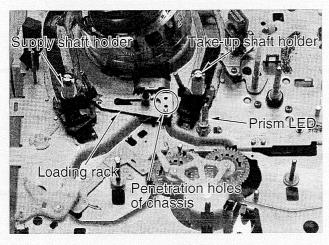


Fig. E7

(5) Assembly of Take-up and Supply Loading arm Move Shaft holder to the unloading position. Adjust the phase of Take-up and Supply loading arm and insert the arm to the shaft (Fig. E8).

- (6) Assembly of Take-up reel table and Take-up brake arm unit
  - Put washer, (Fig. E10) Take-up reel table and Take-up brake arm unit together (Fig. E9).

NOTE: The shape between portion A for Take-up reel table and portion B for Supply reel table is different.

Therefore, confirm the shape of portion A and B before mounting reel tables. If Take-up reel table has been confused with Supply reel table and they have been installed, the trouble of reel table rotation slip happens (Fig. E11).

#### **TOP VIEW**

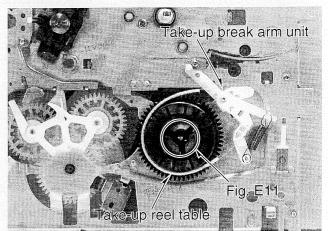


Fig. E9

#### **BOTTOM VIEW**

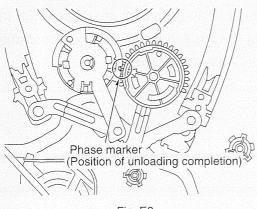


Fig. E8

#### SIDE VIEW

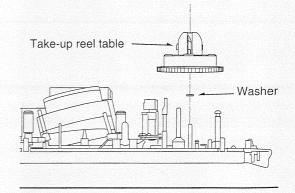


Fig. E10

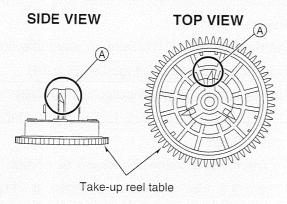


Fig. E11

(7) Assembly of Supply reel table and Tension arm unit

Install washer (Fig. E13) and Supply reel table. Insert Tension arm unit to Tension arm projection and hang Tension spring with Supply spring arm projection (Fig. E12).

\*1 Pay an attention of Position of the Supply spring arm.

NOTE: The shape between portion A for Take-up reel table and portion B for Supply reel table is different.

Therefore, confirm the shape of portion A and B before mounting reel tables. If Take-up reel table has been confused with Supply reel table and they have been installed, the trouble of reel table rotation slip happens (Fig. E14).

# **TOP VIEW**

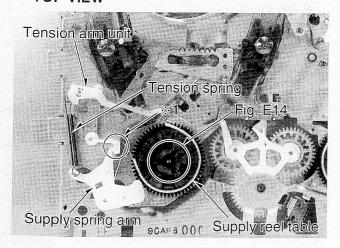


Fig. E12

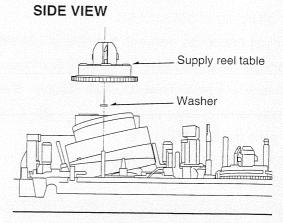


Fig. E13

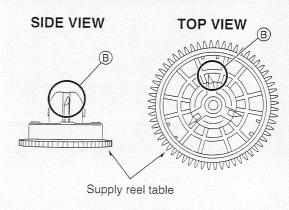


Fig. E14

(8) Assembly of Drive main lever arm
Install Drive main lever arm so that Drive main lever arm fits to the groove of Chassis.

And rotate Drive main lever arm to the clockwise in order to adjust the phase between the hole of the position fixture and the penetration hole of Chassis (Fig. E15).

#### **TOP VIEW**

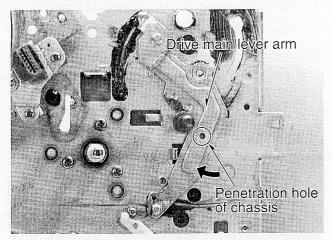


Fig. E15

(9) Assembly of Conversion lever A, P5 arm and Main lever

Install Conversion lever A and P5 arm (Fig. E16, E17).

Adjust the phase of Main lever so that Main lever fits the projection of Loading rack.

Main lever has to be locked at the projection of Chassis by 1 tab, and 2 tabs of Prism LED (Fig. E16).

 Conversion lever A, P5 arm, Supply brake arm unit and the projection of Take-up brake arm have to be installed to the groove under the Main lever (Fig. E18).

#### **TOP VIEW**

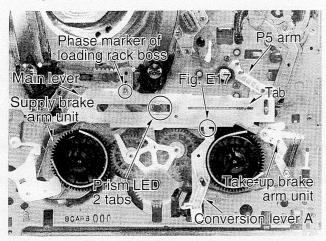


Fig. E16

#### **TOP VIEW**

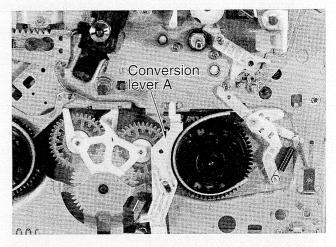


Fig. E17

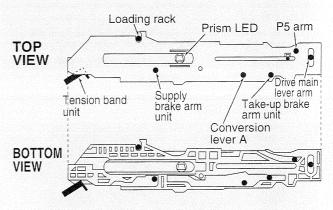


Fig. E18

#### (10) Assembly of Drive rack arm

Install Drive rack arm so that Drive rack arm fits the groove of Chassis and rotate it to the clockwise in order to fit the penetration hole of Chassis (Fig. E19).

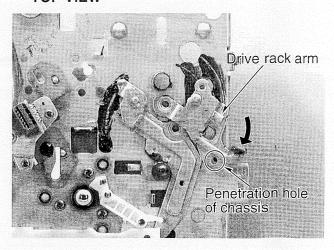


Fig. E19

(11) Assembly of Main cam gear
Install Main cam gear so that Main cam gear fits
the penetration hole of Chassis (Fig. E20) and
fix it by the snap washer from the bottom of
Chassis (Fig. E21).

#### **TOP VIEW**

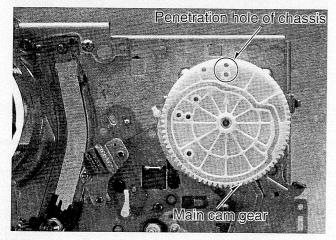


Fig. E20

#### **BOTTOM VIEW**

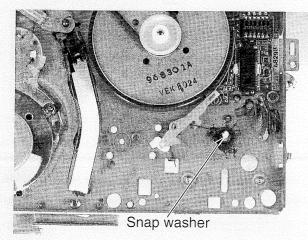




Fig. E21

- (12) Assembly of Loading motor unit Install Loading motor unit so that Loading motor unit fits the groove of Chassis (Fig. E22).
- (13) Assembly of Pinch arm Put Pinch arm together and install Opener piece to fix Pinch arm (Fig. E22).

#### **TOP VIEW**

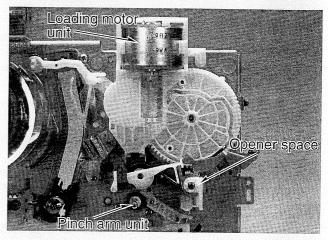


Fig. E22

# 4-3. Assembly of mechanism chassis

- 1. Assembly of Mechanism chassis
- (1) Adjust the phase of Position switch in Main C.B.A..

Rotate Position switch until the click point. The projection of Position switch should be set to just above (Fig. F1).

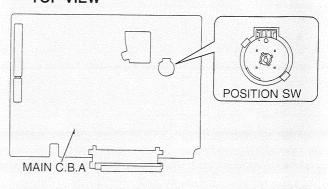
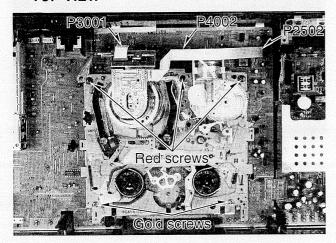
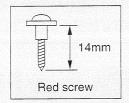


Fig. F1

(2) Assembly of Mechanism chassis Put Mechanism chassis on Main C.B.A. and fix it by 5 screws (3 red screws and 2 gold screws). Connect P3001, P2502 and P4002 (Fig. F2).

#### **TOP VIEW**





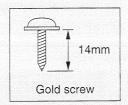


Fig. F2

- The red screws has a gap among the chassis.
  Therefore be careful not to tighten too much.
- 2. Assembly of Cassette holder unit
- (1) Assembly of Main shaft Install Main shaft so that Main shaft fits the groove of Chassis (Fig. F3).

#### **TOP VIEW**

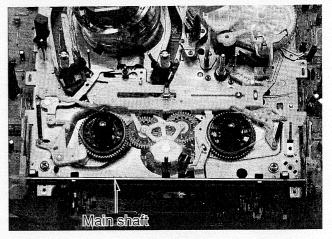
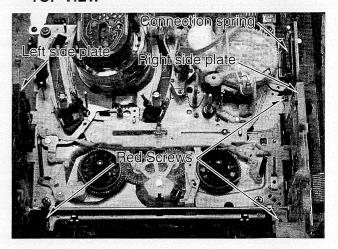


Fig. F3

(2) Assembly of Left & Right side plate Install Left side plate so that Left side plate fits the groove of Chassis and fix it by the red screws.

After adjustment the phase of waper arm and Drive rack (Fig. F5), install Right side plate so that Right side plate fits the groove of Chassis and fix it by 2 red screws. Hang connection spring on the projection of Drive rack arm (Fig. F4, F5).



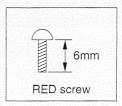


Fig. F4

## SIDE VIEW

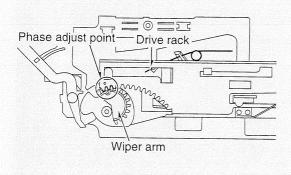


Fig. F5

#### **TOP VIEW**

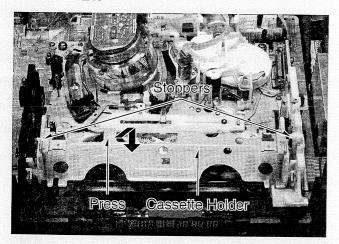


Fig. F6

(3) Assembly of Cassette holder Install Cassette holder so that Cassette holder fits the groove of Waper arm installed in Main shaft (Fig. F6, F7).

#### **TOP VIEW**

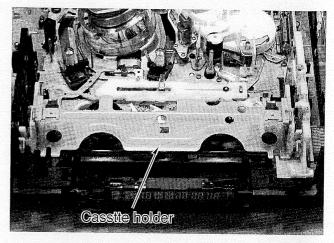
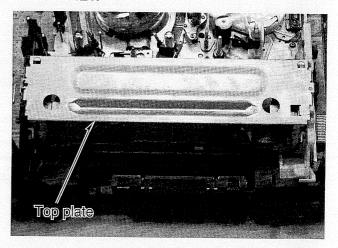
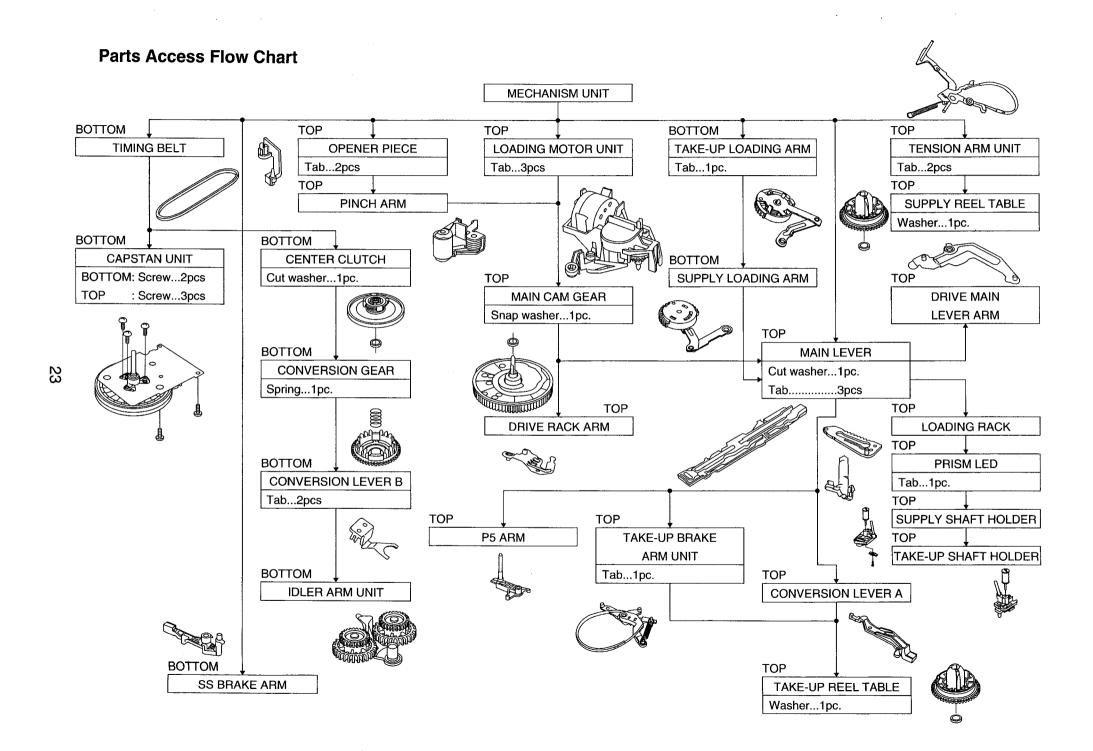


Fig. F7

- (4) Assembly of Top plate Install Top plate so that Top plate fits the groove of Left and Right side plate.
- Fix Top plate by tightening screw when the tabs of Left and Right side plate broke (Fig. F8).



(5) Install Front panel unit and Top panel



# 5. MECHANICAL ADJUSTMENT PROCEDURE

## 5-1. Tension post position adjustment

Equipment required: Hex. Wrench (VFK0326)

Specification: 50.5±1.5 mm

- (1) Disconnect the AC plug.
- (2) Remove the TOP PLATE.
- (3) Turn the LOADING MOTOR until the loading completes.
- (4) Adjust the hole of Tension Band Fastener by Hex Wrench until the distance between the Tension Post and the center of Supply reel table is 50.5±1.5 mm as shown in Fig. M1.

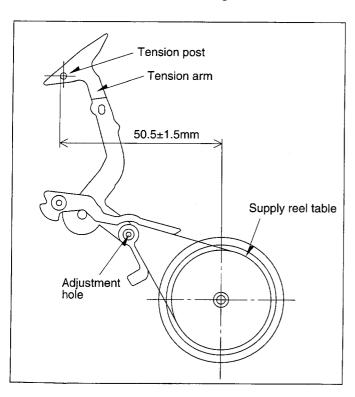


Fig. M1

#### 5-2. Back tension adjustment

Equipment required:

Back Tension Meter (VFK0132)

VHS Cassette tape (180 minutes tape: PAL)

VHS Cassette tape (120 minutes tape: NTSC)

Specification: 22.5-27.5g

- (1) Playback the cassette tape from the beginning and wait until the tape movement get the stabilization. (for approx. 10–20 seconds)
- (2) Insert the Back Tension Meter into the path of a tape, and measure the back tension to be within specification as shown in Fig. M2.

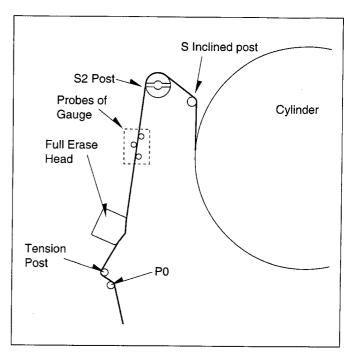


Fig. M2

(3) If it is out of specification, change the spring notch as shown in Fig. M3.

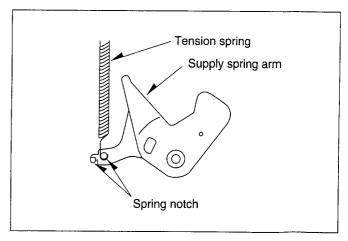


Fig. M3

# 5-3. P2 and P3 posts adjustment (PREADJUSTMENT)

Equipment Required:

Post Adjustment Screwdriver (VFK0329)

- (1) Remove the Top Plate.
- (2) Turn the Loading Motor until the unloading completes.
- (3) Rotate the P2 and P3 Posts clockwise to the end. (Fig. M4)
- (4) Rotate the P2 and P3 Posts twice counterclockwise. (Fig. M4)

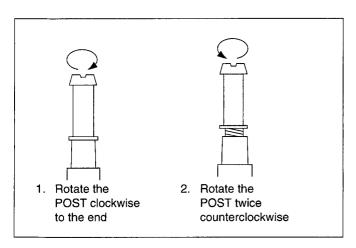


Fig. M4

(5) Playback the cassette tape and make sure that the edges of the tape are not curling at the bottom or top end of the P2, P3, and P4 Posts as shown in Fig. M5.

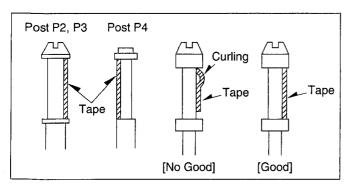


Fig. M5

(6) If the curling appears, readjusts the P2 and P3 Posts.

### 5-4. Tape interchangeability adjustment

Carry out the following procedures for Tape Interchangeability Adjustment to do it correctly and smoothly.

- (1) P2 AND P3 POSTS ADJUSTMENT
- (2) ADJUSTMENT OF P4 POST
- (3) HEIGHT ADJUSTMENT OF A/C HEAD
- (4) FINE-ADJUSTMENT OF A/C HEAD
- (5) ADJUSTMENT OF X-VALUE (PREADJUSTMENT)
- (6) FINE-ADJUSTMENT OF X-VALUE

If the Tape Interchangeability Adjustment is not perfect, repeat the above procedures from (1) to (6).

CAUTIONS: To make an Adjustment Mode for Tape Interchangeability, press the FF and EJECT buttons simultaneously 3 times to set the Service Mode 2.

In case of VCR mounted shuttle ring, turn the shuttle ring to FF and then press EJECT button.

In Loewe model, STOP button is used instead of FF button.

NOTE: Cleaning the Tape Transport path before adjusting of Tape Interchangeability. The detail portion is shown below.

P0 Post, Tension Posts, FE Head, P2 Post, Supply Inclined Post, Cylinder Unit, Take-up Inclined Post, P3 Post, A/C Head, P4 Post, Pinch Roller, Capstan Shaft, P5 Post. FE Head, Cylinder Unit, A/C Head and Capstan Shaft are more important parts and pay an attention to clean them.

### 5-4-(1). P2 AND P3 POSTS ADJUSTMENT

Equipment required:

Alignment Tape (PAL/SECAM: VFJ8125H3F)

(NTSC: VFM8080HQFP)

Post Adjustment Screwdriver (VFK0329)

(1) Connect the oscilloscope to the output of the Head Amp as shown in Fig. M6.

NOTE: To get a stable waveform of the Head Amp output (observation point TW3001 and TW2001 located on Main C.B.A.) on the oscilloscope, use the head switching pulse as a triggering signal as shown in Fig. M6.

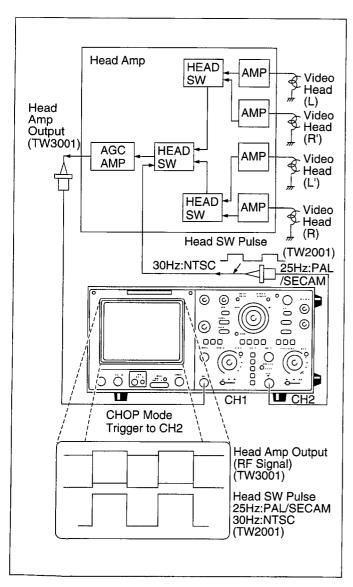


Fig. M6 Connect of Oscilloscope

- (2) Playback the Alignment Tape.
- (3) If the RF envelope appears like example "A" or "B" in Fig. M7, then adjustment of the tape guide post (P2: Entrance) is necessary.
- (4) Adjust the tape guide post (P2) with the post adjustment screwdriver so that the RF envelope waveform at the entrance portion becomes flat as shown in Fig. M7 "C".

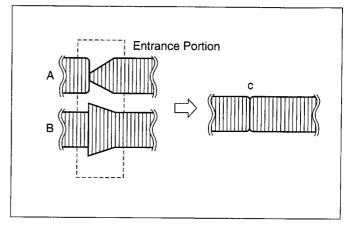


Fig. M7

- (5) If the RF envelope appears like "D" or "E" in Fig. M8, then adjustment of the tape guide post (P3: Exit) is necessary.
- (6) Adjust the tape guide post (P3) in the same manner as the P2 post so that the exit portion becomes flat as shown in Fig. M8 "F".

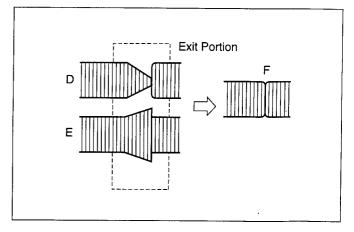


Fig. M8

- (7) Keep pressing the tracking up/down (\( \lambda \) or \( \lambda \)) buttons on the remote controller unit. The output envelope should vary nearly parallel with other condition as shown in Fig. M9.
- (8) Set the tracking control into center fix position by pressing the tracking up/down (∧ and ∨) simultaneously and adjust for maximum RF envelope, whilst being as flat as possible.

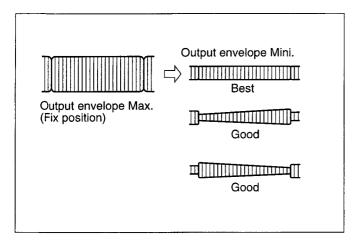


Fig. M9

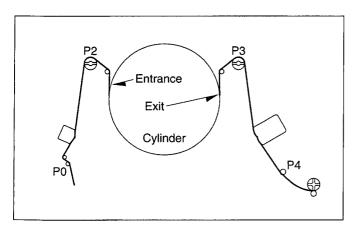


Fig. M10 Loading of Posts

# 5-4-(2). ADJUSTMENT OF P4 POST

- (1) Install A/C Head on the Mechanism Chassis by one screw.
- (2) Playback the Alignment Tape.
- (3) Rotate the screw (A) or (B) until the wrinkle appears on the lower edge of tape at P4 Post.
- (4) Rotate the screw (A) or (B) until the wrinkle just disappears on the lower edge of tape at P4 Post.
- (5) Connect the oscilloscope to audio output terminal
- (6) Rotate the screw (C) until audio signal is maximized.

NOTE: 1. The relation between the rotation direction of screws (A) and (B) and the condition of wrinkle on the lower edge at P4 Post as shown in Fig. M11.

2. Make sure that there is not the inclined wrinkle between P4 Post and Pinch Roller.

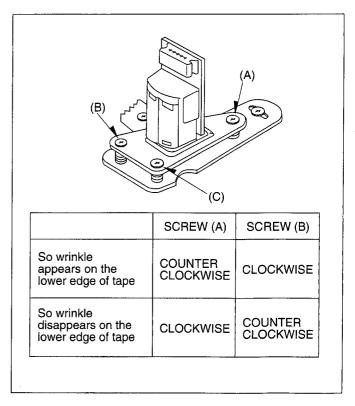


Fig. M11

# 5-4-(3). HEIGHT ADJUSTMENT OF A/C HEAD

<When moving the A/C Head up>

- Rotate the screw (A) counterclockwise until the wrinkle appears on the lower edge of tape at P4 Post.
- (2) Rotate the screw (B) counterclockwise until the wrinkle just disappears on the lower edge of tape at P4 post.
- (3) Rotate the screw (C) counterclockwise until the audio signal is maximized.

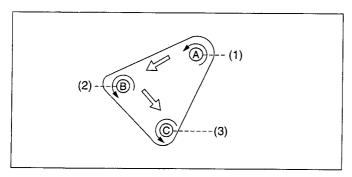


Fig. M12

<When moving the A/C Head down>

- (1) Rotate the screw (B) clockwise until the wrinkle appears on the lower edge of tape at P4 Post.
- (2) Rotate the screw (A) clockwise until the wrinkle just disappears on the lower edge of tape at P4 post.
- (3) Rotate the screw (C) clockwise until the audio signal is maximized.

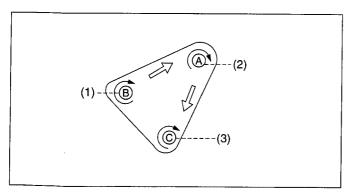


Fig. M13

# 5-4-(4). FINE-ADJUSTMENT OF A/C HEAD

- (1) Connect the oscilloscope to the output of the Head Amp as shown in Fig. M6.
- (2) Playback the Alignment Tape.
- (3) Make sure that the condition of the wrinkle at P4 Post. If the condition of the wrinkle is out of specification, P4 Post adjustment has to be performed as follows.

Turn the screw (A) counterclockwise until the wrinkle appears on the lower edge of tape at P4 Post.

Turn the screw (A) clockwise until the wrinkle disappears on the lower edge of tape at P4 Post.

(4) Turn the screw (C) until the audio signal is maximized.

NOTE: Make sure that the audio output does not increase when push the upper and lower edges of tape around A/C Head.

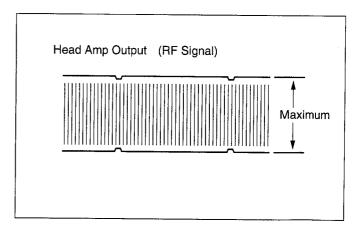


Fig. M14

# 5-4-(5). ADJUSTMENT OF X-VALUE (PREADJUSTMENT)

Equipment required:

Fine Adjustment Gear Drive (VFK0330)

Specification: Less than 15 msec.

(1) Connect the oscilloscope to the audio output and the video output. Both output signals should be fixed by the external trigger.

- (2) Playback the Alignment Tape and set the tracking control into center fix position.
- (3) Adjust A/C Head position by the Fine Adjustment Gear Driver (VFK0330) to meet the signal fault portion of the audio output and the video output signals (Less than 15 msec.).
- (4) After meeting the signal fault portion, adjust A/C Head position by the Fine Adjustment Gear Driver (VFK0330) until the video envelope is maximized.

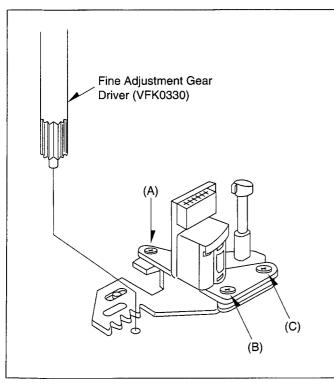


Fig. M15

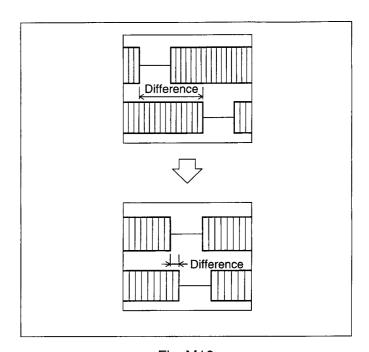


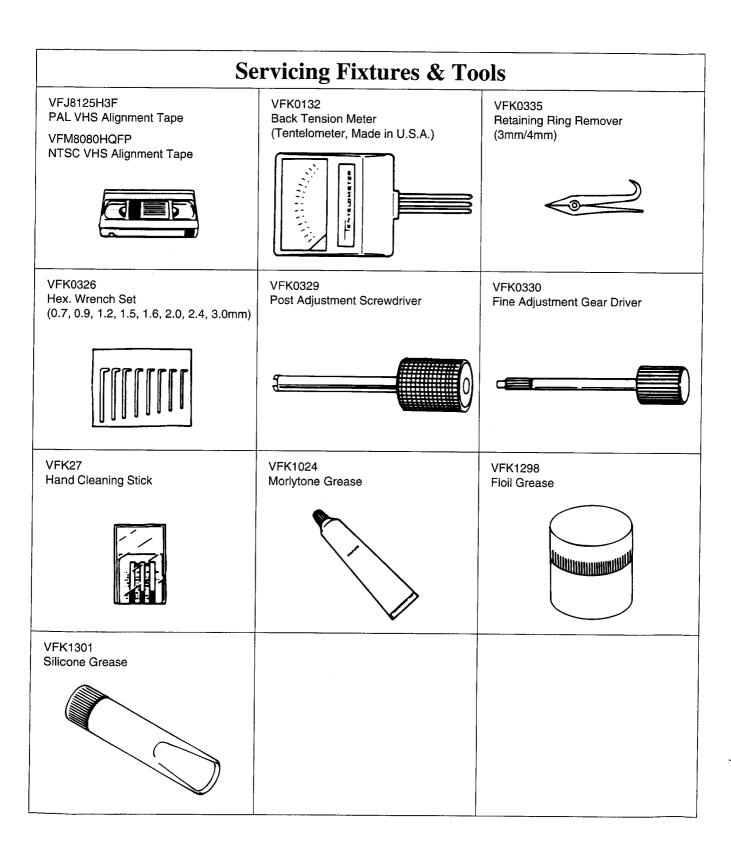
Fig. M16 **5-4-(6). FINE-ADJUSTMENT OF X-VALUE** 

Equipment required:

Fine Adjustment Gear Drive (VFK0330)

- (1) Connect the oscilloscope to the audio output and the video output. Both output signals should be fixed by the external trigger.
- (2) Playback the alignment tape and set the tracking control into center fix position.
- (3) Adjust A/C Head position by the Fine adjustment Gear Driver (VFK0330) until the video envelope level is maximized at the tracking center fix position.

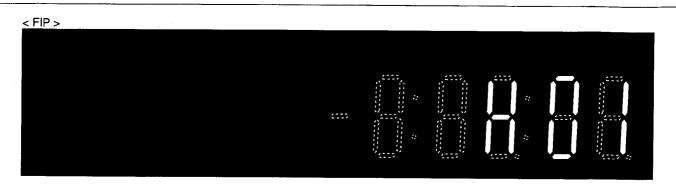
NOTE: During X-Value Fine Adjustment, in case the video envelope level became 0, Preadjustment of X-value should be adjusted again due to it is possibility to vary the X-value adjustment.



#### 6. SELF-TEST INDICATION DISPLAY

This VTR has a self-diagnosis and display function. If the VTR detects trouble during installation or during use, one of the following fault indication codes will automatically appear in the VTR display. Fault indication codes are displayed in the form of a single English letter followed by two numbers, as for example "H01".

- Note: 1. The indication "U" is displayed on the FIP while power remains on.
  - 2. Otherwise, the indication "H" or "F" is displayed on the FIP, and the power is automatically turned off.
    - When the power is turned on again, the fault indication code will disappear and the unit will retrun to normal display mode (either clock or counter is displayed).
  - 3. This fault indication code will be stored in the microprocessor even with the AC plug disconnected.
    - The two-digit number portion of the stored fault indication code can be redisplayed in the FIP's "second" display portion (the last 2 digits on the light) by placing the unit is Service Mode Number 2 when turning on Service Information Display as for example "01" or "02" etc.
    - If a second error occurs, only the most recent error will be displayed and stored.
  - 4. To erase the stored fault indication code data, press FF and EJECT buttons for 5 seconds.



INDICATION	CAUSE	REMEDY/CHECK				
U 10	Dew formation.	Wait until the indication disappears.				
H 01	After cylinder lock is detected, the cylinder does not start rotating again even after tape unloading.	Check the cylinder unit and the cylinder motor drive circuit.				
H 02	Cassette tape is not wound up during tape unloading except Eject mode.	Check the capstan unit and the capstan motor drive circuit.				
F 03	Mechanism locks during mode transition except Eject mode.	<ol> <li>Check the loading motor drive circuit.</li> <li>Check the mechanism phase alignment.</li> <li>Check the mode switch.</li> </ol>				
F 04	Mechanism locks during tape unloading.	<ol> <li>Check the loading motor drive circuit.</li> <li>Check the mechanism phase alignment.</li> </ol>				
F 06	Mechanism locks after tape unloading in Eject mode.	Check the loading motor drive circuit.     Check the mechanism phase alignment for cassette holder unit.  Protection of the overcurrent flowing in transistor which produce the power supply for recording mode.				
F 07	During recording mode recording signal is less than the normal condition.					
F 08	Recording circuit works except recording mode.	Check the recording circuit.				
H 16	Cylinder lock detection.	Check the cylinder unit and the cylinder motor drive circuit.				
H 17	Supply reel mechanism lock detection.	Check the supply reel mechanism and the supply reel circuit.				
H 18	Take-up reel mechanism lock detection.	Check the take-up reel mechanism and the take-up reel circuit.				

Fig. T1 Self-Test indication Display

#### 7. SERVICE INFORMATION DISPLAY

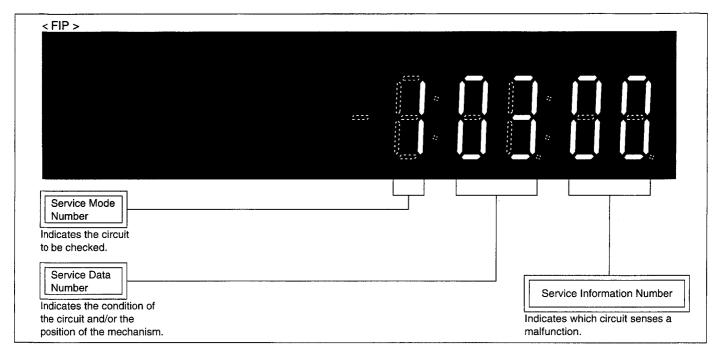


Fig. D1 Service Information Display

#### 7-1. Purpose of Service Information Display

This information aids trouble shooting by indicating the source of the malfunction. The service mode number & service data number are used by the technician during repair while the service information can be used by consumer to diagnose malfunctions allowing the technician to provide a more accurate repair cost estimate and reduce repair time.

#### 7-2. Turning on Service Information Display

Press FF and EJECT buttons simultaneously for more than 3 seconds. In case of VCR mounted shuttle ring, turn the shuttle ring to FF and then press EJECT button for more than 3 seconds.

In Loewe model, STOP button is used instead of FF button.

In the Service Information Display, there are four digits divided into 3 functions.

The first digit indicates which of the 7 service modes that the unit is currently in.

MODE 1: Checks tape protection circuit.

MODE 2: Checks tape transport mechanism.

MODE 3: Checks mode switching operation.

MODE 4: Checks control buttons.

MODE 5: Checks capstan motor.

MODE 6: Checks cylinder motor.

MODE 7: Checks loading/unloading operation.

The second and third digits are service data which indicate the condition of the circuit or mechanism being checked.

The forth digit is the service infromation display. It is to be used by the consumer to help determine the source of a malfunction. The service information display operates independently of the service modes and stores the fault indication in memory for as long as AC power is not supplied.

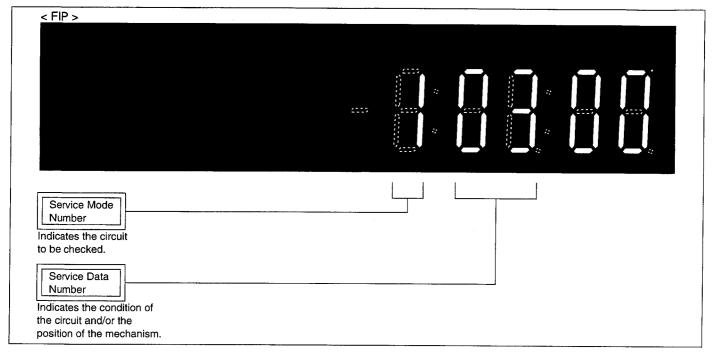


Fig. D2 Service Mode Number and Service Data Number on F.I.P.

#### 7-3. Use of Service Modes

- (1) Turn on Service information Display.
- (2) To change Service Modes, press FF and EJECT buttons simultaneously.
- (3) Mode 0: Storing the process number when the fault happened.
- (4) Mode 1: Checks that the sensor LED, Supply & Take-up sensor circuits checks the circuits by blocking the light from the sensor LED to either or both Supply & Take-up Sensors. When the light is blocked to both sensors, "00" should be indicated on the service data number.
  - When the light is blocked to the supply sensor, "01" should be indicated.
- (5) Mode 2: Checks the mode switch circuit while indicating mechanism position.
  Service Data Numbers indicate the position of the mode switch and there by the mechanism position.
- (6) Mode 3: Checks that mode switch circuit operations have been completed.
  Service Data Number should indicate "00" after each mechanism operation is completed.

- (7) Mode 4: Checks the operation circuit.
  Indicates if SYSTEM CONTROL IC receives the operating commands from the mode buttons and/or remote controller.
- (8) Mode 5: Checks the capstan motor circuit.
  Indicates if the SYSTEM CONTROL IC has received the command to rotate the capstan motor.
- (9) Mode 6: Checks the cylinder motor circuit.
  SYSTEM CONTROL IC has received the command to rotate the cylinder motor.
- (10) Mode 7: Checks the loading/unloading operation.
  The loading motor rotates for loading operation when the "PLAY" button is pressed.
  The loading motor rotates for unloading operation when the "STOP" button is pressed.
  This mode can be displayed indefinitely until the OPERATE button is pressed.

<NOTE> Refer to Fig. D5 for details of Service Data Numbers.

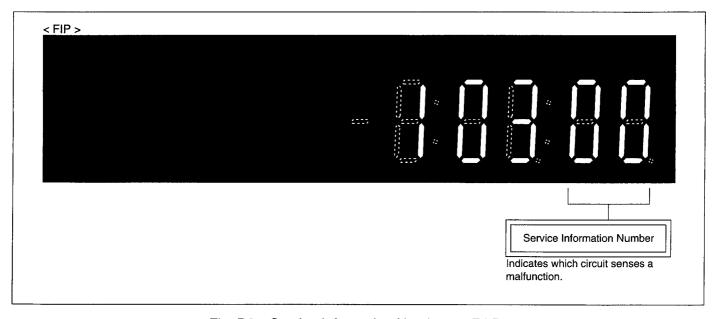


Fig. D3 Service Information Number on F.I.P.

#### 7-4. Service Information Number

Refer to Fig. D4 for details of Service Infromation Number.

NOTE: The Service Information Number display is independent of the service mode display. The Service Information Number will be stored as long as AC power is not supplied. (If can be displayed in the Service Mode 2.)

If a second error occurs, only the most recent error will be displayed.

Service Information Number	Malfunction
00	Normal condition (No problem)
10	Dew formation
01	Cylinder stop
02	Tape reel stop
03	Stop at position other than 04 or 06
04	Stop during unloading
06	Stop during Cassette-in/Eject operation
07	Recording circuit stop in recording mode.
08	Recording circuit stop except recording mode.
16	Cylinder lock
. 17	Supply reel lock
18	Take-up reel lock
2*	PG shifter automatic adjustment error

Fig. D4 Detail Service Information Number

#### 7-5. Test Mode

When the test terminals are shorted during turning off condition, the following operation will be performed after AC power is applied. Test Mode Information will be displayed on FIP insted of linear counter. To release Test mode, test Terminales should be opened.

- (1) Power will be turned on automatically when AC power is applied.
- (2) The direct operation of buttons are able to be performed.
  (Examle) PLAY←→REC, REC→EJECT, REC→FF/REW
- (3) In case the mechanism is in PLAY position, the mechanism goes into PLAY mode when AC power is applied.
- (4) Playback CVC function is turned off.
- (5) Tracking is fixed under power off and cassette in. Auto tracking does not perform.
- (6) For recording current adjustment.
- (7) For reverse slow tracking adjustment.
- (8) When the power is turned off, tracking is fixed.

Service Mode		Service Data						
Number	Note for checking Service Data Numbers		Indication	Remarks				
		00	No light detected at either sensor	Tape not required.				
		01	Tape beginning					
1		UI	Light to Supply photo sensor is blocked.					
•	<del></del>	02	Tape end					
		02	Light to Take-up photo sensor is blocked.					
		03	Light detected at both sensors.	_				
		00	EJECT	Tape required				
		01	Cassette down	*1. STOP3: Pintch roller is on Capstan motor				
		02	REV, REV SLOW	shaft.				
		03	Loading/Unloading	*2. STOP: Pintch roller is off Capstan motor shaft.				
2	<del></del>	04	PLAY, REC, STILL, PAUSE, CUE, FWD SLOW,					
			STOP3*1					
		05	STOP*2					
		06	FF/REW					
		07	Intermediate position					
	Disregard service data displayed until mechanism		Any display other than "00" indicates a fault in the	Tape required.				
3	operation is completed.	00	mode switch circuit or system.					
	Then the display should indicate "00".							
4	Display only when the operating button is pressed.			Tape not required.				
	Left digit only, disregard Right digit display.	8 1	8, 9, u, A,, n, L and no display indicate that the	Tape required.				
		Left Right	Capstan motor "PLAY" command received by	If a symbol other than those listed is displayed, a				
		Digit Digit	System control microprocessor.	mulfunction in that circuit is indicated.				
	Right digit only, disregard left digit dispaly.	8 7	1, 2, 3, 4, 5, 6, 7 indicate that the Capstan motor					
5		Left Right	"CUE, FF, FWD SLOW" commands received by					
		Digit Digit	system control microprocessor.					
	Right digit only, disregard left digit display.	8 —	8, 9, u, A, —, n, L and no display indicate that the					
		Left Right	Capstan motor "Reverse, REW, Reverse Slow"					
		Digit Digit	commands received by system control					
			microprocessor.					
	Left digit only, disregard Right digit display.	1 0	1, 3, 5, 7, 9, A, n and no display indicate that the	Tape required.				
6		Left Right	cylinder motor "ON" command received by system	If a symbol other than those listed is displayed, a				
		Digit Digit	control microprocessor.	mulfunction in that circuit is indicated.				

Fig. D5 Service Data Display and Indication

## 7-6. Timing chart from Mode SW to System control IC

System control IC senses the mechanical position through the Mode SW.

Fig. D6 shows the timing for service mode number 2.

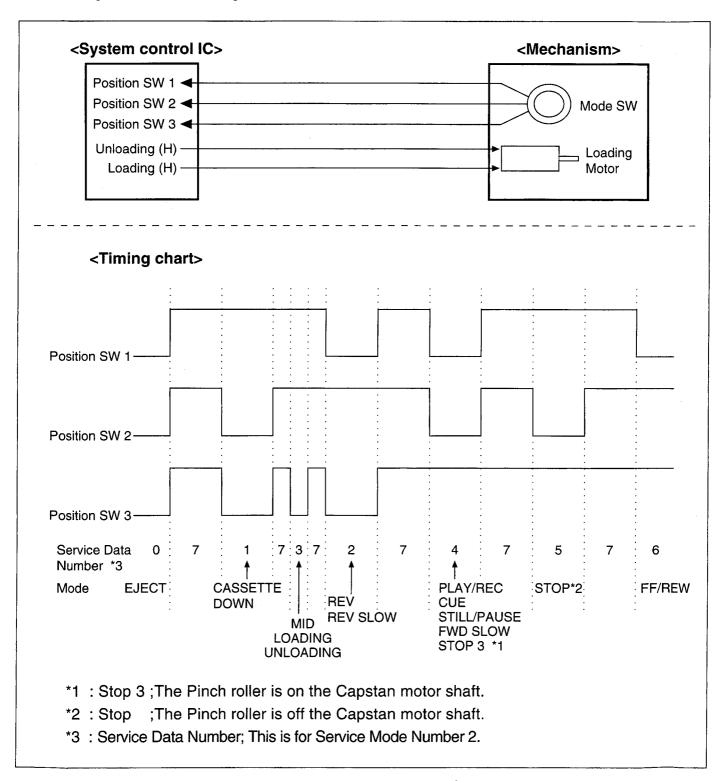


Fig. D6 Timing chart of Mode SW

#### 8. SYSTEM CONTROL CIRCUIT & MECHANISM CONTROL CIRCUIT

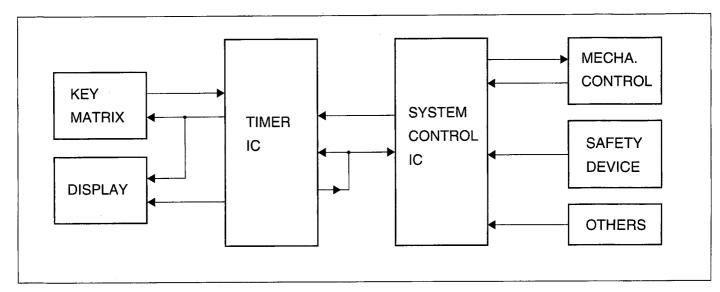


Fig. S1 Overall Block Diagram of System Control Circuit

## 8-1. STOP3 Specification

- (1) The STOP3 is the playback stand-by mode.
- (2) The unit is put into the STOP3 position after tape loading if the cassette tape does not have a clear leader tape.
- (3) If the unit is in the STOP3 position when the power is switched off (included the Timer stand-by mode), the unit goes to the STOP position.
- (4) If the cassette is in the unit when the power is turned on, the unit goes to the STOP3 position.
- (5) When the cassette tape has clear leader tape, the unit is in loading mode after winding up the clear leader tape by Take-up reel at the cassette down position and the unit goes to STOP3 position.

# 8-2. Stand-by in the STOP3 position

- (1) The unit goes to STOP3 position when the Stop mode is selected during the Play or Rec operations. The unit then loosens the tape tension by performing the Reverse Slow.
  - The Reverse Slow corresponds to the FG 40 pulses of the capstan (irrespective of SP/LP modes). The cylinder continues to rotate.
- (2) After about 5 minutes in STOP3 mode, the unit shifts to the Stop position and then the unit stops the cylinder rotation.

# 8-3. Supply and Take-up Sensors

Supply and Take-up photo transistors are used to sense the beginning and end of a tape. The tape has transparent leaders at the beginning and end.

When these transparent leaders enter the tape transport path, they allow infrared light from the sensor LED to reach either one of the tape end sensors (photo-transistor).

If the Take-up end sensor detects the light, the microprocessor SYSTEM CONTROL IC places the VCR in the Stop mode and then performs a short Cue.

If the Supply end sensor is triggered, the microprocessor activates the Stop mode and the Rewind mode. The Rewind mode continues until the Take-up end sensor detects the end of the tape. The tape beginning is detects by a low signal at SYSTEM CONTROL IC Take-up photo terminal. The tape end is detected by a low signal at SYSTEM CONTROL IC Supply photo terminal.

If the light is received at both sensors at same time, the cassette is ejected.

<Operation after detecting the beginning and the end of tape>

Mode	Detection of the beginning	Detection of the end
Power off→on	Short CUE	Short REW
Cassette in	Short CUE	Short REW
Loading	Short CUE	Short REW
FF/CUE		Auto REW
REW/REV	Short CUE	
PLAY, REC		Auto REW
Timer REC		Power off

Both ends of tape detection (tape cut, no cassette).

(1) Cassette in:

The cassette tape is ejected

(2) Other mode:

The unit goes to Stop mode and it is impossible to operate except EJECT key.

(3) Timer REC:

Power is turned off after short CUE is performed.

# 8-4. Safety Tab Switch

A recorded video cassette can be protected against accidental erasure by breaking off the tab on the cassette. The cassette can now only be used for playback. To be able to record on the cassette, cover the hole with adhesive tape. If the safety tab on the cassette has been removed, Safety Tab Switch is off (open) and high signal is supplied to SYSTEM CONTROL IC Safety Tab terminal. The SYSTEM CONTROL IC will not go into the recording mode and automatically places the VCR in the playback mode.

#### 8-5. Dew Sensor

If excessive moisture or condensation is present inside the machine (an internal humidity of more than 98%) the unit will stop if running. Until the moisture level decreases only the Eject mode will operate. To sense the humidity, a dew sensor is used. The sensor is a special variable resistor which change resistance with ambient humidity.

The sensor ranges in resistance from about 5K ohm at 90% humidity to about 50K omh at 98% humidity. Normally, the voltage across the sensor is low because of its low resistance.

But if moisture condenses inside the unit, the SYSTEM CONTROL IC voltage of Dew terminal increases to indicate a Dew condition.

Tape	Mode	Dew sensor ON	Dew sensor OFF		
	Power	Compulsory Power on	Power off		
	Dew indication	Indicate "d" and "U10"	Normal indication		
	Cylinder	Rotating *1	Stop		
OUT	Key operation	Not possible *2	Possible		
	Cassette in	Immediately a cassette is	Possible		
		ejected after it goes to			
		cassette down position.			
	Power	Compulsory Power on	Power off		
	Dew indication	Indication "d" and "U10"	Normal indication		
	Cylinder	Rotating *1	Stop		
IN	Key operation	Not possible *2	Possible		
	Cassette condition	A cassette goes to down	Stand-by mode at STOP3		
		position and is in stand-by	position.		
		mode.			

<sup>\*1:</sup> When the cylinder locks in dew mode, it will be released until dew sensor is truned off.

During Dew formation is detected and 80 minutes after completion of Dew

2. The keys which do not relate to the tape failining operation, are able to be used.

detection.

Dew sensor on:

Dew sensor off: 80 minutes later after copmletion of Dew detection.

<sup>\*2:</sup> The keys which do not relate to the tape running operation, are able to be used.

#### 8-6. Setting time for each mode

The time is set on each mode in order to protect tape and capstan driver. When the setting time is over, the mode is gone to the next mode.

Mode	Setting time	Switching mode
STILL, PAUSE	Approximately 5 minutes	STOP
CUE/REV lock	Approximately 10 minutes	PLAY
SLOW	Approximately 10 minutes	STOP

#### 8-7. Operation of short CUE

Short CUE stops when the Take-up photo sensor detects the black portion of the tape.

However its sensor does not detect the black portion within 4.0±1.0 sec., the mode except Power on/off and Eject modes will be abe to be operated after the unit stops. This is same as the timer over operation of the reel lock.

#### 8-8. Loading/Unloading Mechanism lock

Loading and unloading times are set, and in case the mechanism locks during loading or unloading operation within the defined time, the unit detects the mechanism lock and loading motor reverses or stops.

Loading operation lock:

Cassette tape is unloaded and ejected within 5 seconds.

Unloading operation lock: Power is truned off within 5 seconds.

#### 8-9. Cassette loading/unloading lock

- (1) Mechanism locks during the cassette in operation.
  - 1 Cassette tape is ejected approximately 2 seconds later when the mechanism locks during the cassette in operation.
  - 2 In case mechanism locks during eject operation, cassette tape is inserted and power is turned off approximately 2 seconds later.
  - 3 When Mechanism locks during cassette in operation, power is turned off approximately 2 seconds.

In case the mechanism lock is released on the way and cassette is ejected, the unit continues the normal operation.

- (2) Mechanism locks during the eject operation.
  - 1) Cassette tape goes to cassette down position approximately 2 seconds later and power is turned off when mechanism locks during eject operation.
  - 2 Mechanism locks during cassette down operation, power is turned off.

#### 8-10. Reel lock operation

When the Suuply or Take-up reel mechanism locks during the tape running, the following operation is performed in order to protect the tape and the capstan driver.

In case of Take-up reel mechanism lock, the detecting time is defined depending on the mechanism position and capstan speed to minimize the tape supplying from supply side.

: Unloading and loading. The unit goes to CUE/REV mode.

PLAY/CUE/REV: Unloading till the cassette down position and loading. The unit goes to STOP3

position.

In play and CUE/REV mode, the reel pulse cycle is started to count after the mechanism mode is fixed.

In case the counted pulse cycle exceeds the defined value, the unit goes to STOP mode due to judge that lock of reel mechanism is detected.

<The value of reel lock detection time>

NTSC/SP mode

1	> <u>/</u>	۱I	S/	P	m	റ	łe.

Mode	Speed (Ratio)	Time (S)
PLAY	±1	3.5
CUE/REV	±2.5	1.6

Mode	Speed (Ratio)	Time (S)
PLAY	±1	3.5
CUE/REV	±2.5	1.6

In FF/REW mode, the unit goes to CUE/REV mode and continues the tape running in the following case.

- 1. (1) Take-up reel pulse can not be detected within 5 seconds after the unit shifted to REW mode.
  - (2) Supply reel pulse can not be detected within 5 seconds after the unit shifted to FF mode.
- 2. The reel pulse can not be detected more than 2 seconds sequentially within 5 seconds after completing the mechanism mode shift.
- 3. The reel pulse can not be detected more than 800 msec. past 5 seconds after completing the mechanism mode shift.

#### 8-11. Cylinder lock

<Start rotation>

When the cylinder neither start rotating nor go to the stability rotation within 5 seconds, it is unloading under keeping the mode. In case the cylinder starts rotating and goes to the stability rotation, the mechanism loads again and continues the holding mode.

If it is not possible, Power is turned off and cylinder trouble "H01" is displayed.

<During rotation>

The head switching pulse is supplied to the cylinder when the cylinder starts the stable revolution. In case the head switching pulse does not come to the cylinder within 0.5 seconds, the cylinder lock is judged and the following operation is activated.

Timer REC mode: Power off

PLAY, REC mode: STOP (Mechanism shifts to MID. position and the unit goes to stand-by mode.)

#### 8-12. Mode transition

The relation between the present mode and operation key is shown in the following table.

PRESET				OPERAT	ION KEY				
MODE	P SW	EJECT	STOP	REW FF		PLAY	PAUSE	REC	
P-OFF	P-ON	EJECT				PLAY			
EJECT	P-OFF		—						
STOP	P-OFF	EJECT	*3	REW	FF	PLAY		REC	
REW	P-OFF	EJECT	STOP	REV	FF	PLAY			
FF	P-OFF	P-OFF EJECT		REW	CUE	PLAY			
REV	P-OFF	EJECT	STOP		*1	PLAY	*2		
CUE	P-OFF	EJECT	STOP	*1		PLAY	*2		
PLAY	P-OFF	EJECT	STOP	*1	*1		*2		
STILL	P-OFF	FF EJECT STOP		*1	*1	PLAY	PLAY	REC PS	
REC	REC P-OFF — ST		STOP				REC PS		
REC/PS	P-OFF		STOP				REC	REC	

Pressing two keys simultaneously, the key operation is going to be ineffective.

- \*1: The unit goes to CUE/REV lock mode by pressing FF/REW key lightly (less than 0.7 seconds) during Play, still and REV mode. CUE/REV mode will be returned previous mode when FF/REW key is pressed more than 0.7 seconds.
- \*2: In case PAUSE key is pressed less than 1 second other than STILL mode, the unit goes to STILL mode.
  - If PAUSE key is being held to press, the unit goes to STILL mode and then goes to 1/10 SLOW mode after 1 second. SLOW mode has not been set in 2 Head LP mode model.
- \*3: When STOP key is pressed more than 3 seconds while a cassette tape is in the unit, the cassette tape is ejected.

#### 8-13. Power on reset

When the power is turned on, the unit is going to reset and the following datas are cleared.

- (1) Position switch data
- (2) Operation mode data
- (3) Prohibition flags

In case the mechanism is in cassette down position, tape slack is removed as the initial operation and the unit goes to STOP3 position.

#### 8-14. Linear time counter operation

The counter value will be gone up/down by counting control pulse. As for NTSC system during Play/Rec mode, counter value goes up/down every 30 pulses. As for PAL system during Play/Rec mode, counter value goes up/down every 25 pulses.

#### 8-15. Tape speed in CUE/REV mode

	CUE/RE	V mode	Hyper-search mode			
MODE	NTSC	PAL	NTSC	PAL		
SP mode	9 times	11 times	9 times	11 times		
EP or LP mode	11 times	11 times	29 times	19 times		

#### 8-16. Automatic functions

- (1) Automatic Power on
  - ① Under power off, when a cassette tape is inserted, power is turned on automatically and cassette tape is loaded.
  - ② Under power off and a cassette tape has been inserted, when PLAY key is pressed, power is turned on automatically and goes to PLAY mode.

#### (2) Automatic play

When a cassette tape removed safety tab is inserted, the mode goes into Play mode.

#### (3) Automatic rewind

When tape running is reached to the end of tape, automatically goes to Rew mode and stops when tape running will be reached to the beginning of tape.

In case of Timer recording, short Rew is performed for 2 seconds and power is turned off when tape running is reached to the end of tape.

#### (4) Power off and Eject

Under power off and a cassette tape has been inserted, when Eject key is pressed, a cassette tape is ejected and power is turned off.

#### 8-17. CUE/REV lock mode

When FF/REW key is pressed lightly (less than 0.7 seconds) during Play, STILL and REV mode, unit goes into CUE/REV mode. To release CUE/REV mode, FF/REW key should be pressed more than 0.7 seconds.

#### 8-18. Hyper-search mode

When FF/REW key is pressed during FF/REW mode, unit goes into CUE/REV mode.

This mode is activated while keeping FF/REW key pressed.

When releasing FF/REW key pressed, this mode is released.

#### 8-19. FF/REW speed

Maximum tape speed is approximately 4.5 m/s during the stable running.

#### 8-20. FF/REW time

The tape running from the beginning to the end of T-120 type (E-180 type) cassette tape is able to be completed within 90 seconds.

# Service Manual

Supplement

Effective from: Running Change

**Video Product** 

Model No. All Z mechanism

**Subject: Change of Mechanism Parts** 

Please use this service manual together with the service manual for Order No. Model No. All Z mechanism

IN	INTERCHANGEABILITY CODE See the I/C column on the following Part Number Lis											lumber List								
Γ	Part	3	Production	Π	Parts		Produ	uction	Π	Parts		Product	tion		Parts		Produ	uction	E	Addition
A	Orig	nal —	Early	<b>]</b> B	Original		<u> </u>	Early	C	Original		E	ariy	D	Original		-	Early	]F	Deletion
l	New	$\geq$	Late		New	_	$\overline{}$	Late		New	_		ate		New			Late	G	Other
P	arts	Numbe	er List																	
Ref No.   Original Part No.   New Part No.   Part Name & Description   I/C   Remarks								ark	s											
1	9 (1)	VED0	363	V	ED041	2	A	CH	ΕA	D UNI	T	·				В				
4	9 (1)	VXL2	737	$ \mathbf{V} $	XL273	3	SI	UPP	LY	BRAK	<b>E AR</b>	M UN	IT		1	G				

# **⚠ WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

# **Panasonic**

Order No. VRD9802006S3

# Service Manual

Cupplement

Effective from: First Production

**Video Product** 

Model No.

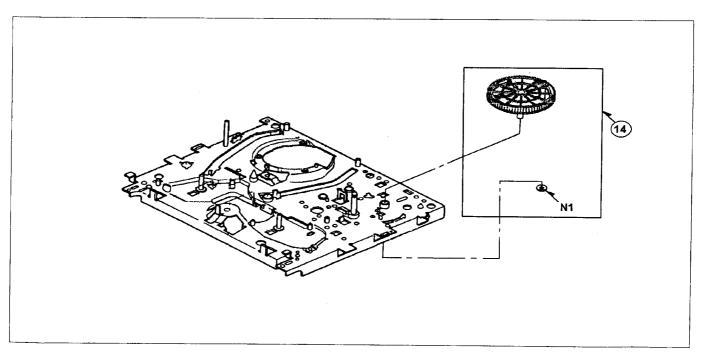
ALL Z Mechanism

**Subject: Revision of Service Manual** 

Please use this service manual together with the service manual for Order No. Model No. All Z Mechanism

INTERCHANGEABILITY CODE  See the I/C column on the following Part Number List													
	Parts	Production		Parts	Production	oduction	Parts	Production		Parts	Production		
A	Origin	al Early	В	Original	Early	C	Original	Early	D	Original —	<b>►</b> Early	F	Deletion
L	New	Late		New	Late		New	Late		New	Late	G	Other
Parts Number List													
Re	ef No.	Original Part No.		New Part No.	F	Part Name & Description				I/C	Remarks		S
14	1 (1)	VDG1220	VI	DG1220KIT	MAIN (	MAIN CAM GEAR KIT				G			

MAIN CAM GEAR KIT (VDG1220KIT) contains MAIN CAM GEAR (VDG1220) and PUSH NUT (VHN0311) as shown in below.



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# **Panasonic**